Stock Assessment and Fishery Evaluation Report
for the
KING AND TANNER CRAB FISHERIES
of the
Bering Sea and Aleutian Islands Regions

2005 Crab SAFE

Compiled by

The Plan Team for the King and Tanner Crab Fisheries
of the Bering Sea and Aleutian Islands

With Contributions by

F. Bowers, W. Donaldson, B. Failor-Rounds, A. Gilson, S. Goodman,
K. Granath, J. Greenberg, G. Harrington, M. Herrmann, S. Hughes, C. Lillo,
G. Merrill, R. Otto, D. Pengilly, L. Rugolo, M.S.M. Siddeek,
J. Soong, B. Stevens, D. Stram, B. J. Turnock,
I. Vining, D. Witherell, and J. Zheng

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605 W. 4th Avenue, #306
Anchorage, AK 99501

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Executive Summary

The annual stock assessment and fishery evaluation (SAFE) report is a requirement of the North Pacific Fishery Management Council's *Fishery Management Plan for Bering Sea/Aleutian Islands King and Tanner Crabs (FMP)*, and a federal requirement [50 CFR Section 602.12(e)]. The SAFE summarizes the current biological and economic status of fisheries, guideline harvest levels (GHL), and analytical information used for management decisions or changes in harvest strategies. The report is assembled by the Crab Plan Team with contributions from the State of Alaska, Department of Fish and Game (ADF&G) and the National Marine Fisheries Service (NMFS), and is available to the public and presented to the North Pacific Fishery Management Council (NPFMC) on an annual basis. Additional information on Bering Sea/Aleutian Islands (BSAI) king and Tanner crab is available on the NMFS web page at www.fakr.noaa.gov and the Alaska Department of Fish and Game (ADF&G) Westward Region web page at www.cf.adfg.state.ak.us/region4/rgn4home.htm.

Status of Annually Surveyed Crab Stocks

The FMP defines the minimum stock size threshold (MSST) and the maximum fishing mortality threshold (MFMT). These requirements are contained in the FMP and outlined in the following section, overfishing parameters. MSST is 50% of the mean total spawning biomass (SB = total biomass of mature males and females, also known as TMB = total mature biomass) for the period 1983-1997, upon which the maximum sustainable yield (MSY) was based. A stock is overfished if the SB is below MSST. MFMT is represented by the sustainable yield (SY) in a given year, which is the MSY rule applied to the current SB (the MSY control rule is F = 0.2 for king crabs, and F = 0.3 for Tanner and snow crabs). Overfishing occurs if the total allowable catch (TAC) exceeds the SY in one year. TACs are developed from joint NMFS and ADF&G assessment of stock conditions based on harvest strategies developed by ADF&G. Figures 1-6 depict each crab stock's spawning biomass and catch history relative to overfishing.

Table 1. MSST, 2005 spawning biomass (SB), sustained yield (SY), and 2005/2006 Total allowable catch levels (TAC) for BSAI king and Tanner crab stocks. Values are in millions of pounds.

Stock	MSST	2005 SB	2005 SY	2005/2006 TAC
Bristol Bay red king	44.8	181.9	36.4	18.3
Pribilof Islands red king	3.3	8.1	1.6	0.0
Pribilof Islands blue king	6.6	1.6	0.3	0.0
Saint Matthew blue king	11.0	5.9	1.2	0.0
EBS Tanner	94.8	162.0	48.6	1.6
EBS snow	460.8	610.7	183.2	37.2

In addition to the Federal requirements, survey results for five stocks (Pribilof District blue king crab, Saint Matthew Island Section blue king crab, Bristol Bay red king crab, eastern Bering Sea Tanner crab, and eastern Bering Sea snow crab) are compared to thresholds established in State of Alaska harvest strategies and regulations. ADF&G uses these thresholds to determine if a fishery should be opened and to calculate the TAC.

<u>Bering Sea Tanner crab</u> (*Chionoecetes bairdi*):

The 2005 survey estimate of mature Tanner crab biomass increased to 162.0 million pounds from the 2004 estimate of 86.9 million pounds. This is the second time in seven years that the stock has increased above the MSST (94.8 million pounds spawning biomass).

The fishery was closed in 1997 due to near-record low stock abundance in the 1997 NMFS survey and extremely poor performance in the 1996 fishery. The stock was declared overfished in 1998 and the Council adopted a rebuilding plan for this stock in October 1999. NMFS approved the rebuilding plan in June 2000 (65 FR 38216). The fishery has been closed since 1997.

Based on the 2005 estimate of total mature biomass (TMB, 162.0 million pounds), the stock remains in "overfished" status for the seventh year since the 1998 overfished declaration because TMB remains below the MSY biomass established for this stock (189.6 million pounds). The estimate for 2005 is above MSST, nearly double the estimate for 2004 (86.8-million pounds), and the highest estimate since the 1998 overfished declaration. Overall, estimates of total mature biomass have shown an increasing trend since the 1998 overfished declaration and the 2005 estimate is more than four times the estimate for 1998 (37.6-million pounds). However, the rate of increase in total mature biomass since 1998 has been extremely slow relative to the increase seen from 1985 through 1991.

The ADF&G estimate for Eastern Subdistrict mature female biomass increased from 13.2 million pounds in 2004 to 31.7 million pounds, which is above the harvest strategy threshold of 21.0 million pounds. Size frequency modes for females at 77.5 mm CW and 57.5 mm CW in 2003, which tracked well from 2001, were greatly diminished in 2004. By contrast, the 2005 size frequency shows the best indication of female crabs greater than 75 mm CW in recent years, and a large mode of immature-sized females behind supporting it. Prior to 2005, abundance estimates of mature-sized females have shown only minor fluctuations about depressed levels in the Eastern Subdistrict. The prolonged depressed level of mature-sized female abundance during the last eight years is in contrast with the rapid recovery from similarly depressed levels that was seen from the mid-1980s through the late-1980s.

The area-swept abundance estimates for mature-sized males in the Eastern Subdistrict also increased markedly in 2005, in contrast to the slight increasing trend that was seen from 1997 through 2004. Since at least 1995 through 2003, most of the mature-sized males were found in the area east of 166° W long. In 2005, however, almost two-thirds of the mature-sized males occurred west of 166° W long. Although estimates of abundance of mature-sized males increased both east and west of 166° W long. The abundance of mature-sized males in the area west of 166° W long. increased at a greater rate from the 2004 level than in the area east of 166° W long. Unlike females, the size frequency distribution for the Eastern Subdistrict in 2004 suggested the possibility for some increase in mature-sized male abundance in 2005.

The area swept abundance estimates for mature-sized males in the Eastern Subdistrict have displayed an increasing trend from 1997 through 2005. The size frequency distribution for the Eastern Subdistrict in 2004 suggested the possibility for some increase in mature-sized male abundance in 2005. The estimated abundance of legal males has also shown an increasing trend since 1997. However, abundance of legal males remains low relative to abundance of mature-sized males, perhaps indicating that sublegal males are not molting into legal size.

The estimated abundance of molting mature males in 2005 is greater in the area west of 166° W long. than the area east of 166° W long. and a greater percentage of mature-sized males were classed as "molting mature males" in the western area. Most unusual in the 2005 data is that estimated abundance of legal-sized males for the area west of 166° W long. is nearly as large as for the area east of 166° W long. and that the abundance of "exploitable legal males" in the area east of 166° W long. exceeds that of the area west of 166° W long. Of the abundance of legal males in the area west of 166° W long. estimated for 2005, approximately 1.0 million are attributable to the area between 166° W long. and 168° W long., an area in which the catch of legal males has historically been low.

The abundance estimate of legal-sized males east of 166º W long. is slightly greater than for the area west of 166º W long. However, ADF&G estimates there to be more "exploitable legal males" in the area west of 166º W long. than in the area east of 166º W long. due to differences in shell-age composition between the areas. ADF&G estimates that 78% of the legal-sized males in the area east of 166º W long. are in old-shell or older condition. In the area west of 166º W long. within the Eastern Subdistrict, ADF&G estimates that only 28% of the legal-sized males are in old-shell or older condition.

Both ADF&G and NMFS estimate 5.745-million legal sized males to be east of 166º W long. and estimate 1.161-million of those to be east of 163º W long. ADF&G estimates 1.002-million of the 1.685-million "exploitable legal males" east of 166º W long. to be in the area east of 163º W longitude.

Based on the ADF&G harvest strategy, a minimum TAC of 4.0 million pounds must be available in the area east of 166° W long. before the commercial fishery may be opened. The calculated TAC for that area was approximately one fourth the minimum, thus that area will not be open to commercial fishing in 2005. West of 166° W long., no minimum TAC is specified. Based on harvest strategy criteria, a 2.29 million pound TAC was set for that portion of the Bering Sea District. The TAC west of 166° W long. was reduced to 1.62 million pounds because ADF&G statistical area 695700 (169° W long. to 170° W long. and 57° N lat. to 57° 30' N lat.) was closed to commercial fishing for Tanner crabs to protect Pribilof blue king crabs. All juvenile and the majority of mature blue king crabs captured during the 2005 survey were found in this statistical area. Approximately 27% of the exploitable legal male Tanner crabs west of 166° W long. were found in this area and the Tanner crab TAC was set using abundance estimates that did not include the closed waters.

Bering Sea snow crab (*Chionoecetes opilio*):

Snow crab spawning biomass in 2005 is estimated to be 610.7 million pounds using the area-swept method.. The estimated TMB in 2005 is above MSST, is the highest since the overfished declaration of 1999, and is nearly twice the average of the TMBs estimated annually for 2002-2004 (317.2-million pounds in 2002, 306.2-million pounds in 2003, and 343.7-million pounds in 2004. Although the results for 2005 are encouraging in this regard, the TMB estimated for 2005 remains below the "rebuilt" level of B_{MSY} and is lower than each of the TMBs estimated annually for 1987-1998. Hence the stock remains in overfished condition in 2005. Relative to the TMBs estimated annually during 2002-2004, the TMB estimated for 2005 indicates an increasing trend towards rebuilding. In the context of the values of TMB estimated for 1999-2005, however, the 2005 TMB estimate suggests only a high point in stock parameter that has been varying about MSST for the last seven years. Relative to annual TMB estimates for 1980-1998, estimated TMB in 2005 is well below average. It should be noted that an increase in estimated TMB in 2001 to a level nearly as high as that estimated for 2005 and which was attributed to an increase in mature male biomass, was followed by three consecutive years of low estimated TMB.

Estimated mature male biomass was 297.6 million pounds, an increase from the 2004 estimate of 174.6 million pounds. The TAC of 37.2 million pounds for the 2005 season represents 6.1% of the estimated TMB and 12.5% of the estimated mature male biomass in 2005. Despite an increase in spawning biomass in 2005, this stock remains in a depressed condition.

The 2005/06 snow crab TAC was calculated using an exploitation rate of 16.88% applied to the mature male biomass. This calculation resulted in a TAC greater than the harvest strategy cap of 58% of the exploited legal male abundance, therefore 2005/06 TAC was set using a 58% harvest rate on the exploited legal male abundance. Exploited legal males are defined as all new-shell male snow crabs greater than or equal to four inches carapace width (CW) and 25% of old-shell male snow crabs greater than or equal to four inches CW.

The estimated abundance of males greater than four inches in CW in 2005 (72.1 million crabs) has increased from the 2004 abundance level of 68 million crabs. The percentage of new shell males greater than four inches in CW from the 2005 survey (approximately 46%) is less than the 2004 estimate of 67%.

Bristol Bay red king crab (*Paralithodes camtschaticus*):

This stock was estimated to be above the stock threshold for a fishery opening. With ESB estimated as greater than 55.0 million pounds, a 15% exploitation rate on mature-sized males is used to determine the TAC. ADF&G estimated that legal crabs harvested in the 2005/06 season will have an average weight of 6.77 pounds. That average weight was applied to 15% of the estimated abundance of mature-sized males (18.04 million; ADF&G LBA base model estimate) to compute the GHL. The 15% harvest rate on mature-sized males provides a harvest of 2.71 million legal males. A harvest of 2.71 million legal males would represent 25% of the estimated abundance of legal males (10.77 million animals; ADF&G LBA base model estimate).

Estimated total mature biomass in 2005 (181.9 million pounds) represents a slight increase from 2004 (176.4 million pounds); the 2005 estimate is twice the MSY biomass currently defined in the FMP. The 2005 LBA base model estimates effective spawning biomass and legal male abundance to be at the highest since 1981 and abundance of mature-sized males and females to be at the highest since 1982.

Based on the size frequency distribution from the 2005 survey some minor recruitment to the mature-sized males can be expected in 2006. However, the mode that has contributed to recruitment of mature-sized females during 2003-2005 surveys appears to have fully recruited to mature-sized in 2005. Although a portion of the new mode of female crabs centered at 72.5 mm may recruit to the mature population in 2006, they would likely only replace those crabs that succumbed to natural mortality in the prior year and an increase in mature female abundance in 2006 is not likely.

The male and female size-frequency distributions for 2005 show a mode of juvenile-sized crabs centered at approximately 72.5-mm CL. Red king crab size modes of this type do not always track into future surveys. However, if those juveniles do remain in the population and are detected in subsequent surveys, they would begin providing recruitment to the mature-sized female class by 2006 and to mature-sized males by 2007.

Pribilof District red king crab (*Paralithodes camtschaticus*):

No formal harvest strategy has been developed for this stock. The stock has been closed to fishing since 1999 due to poor fishery performance in the mid-late 1990s, imprecision of abundance estimates, and concerns about bycatch of blue king crab. Concerns about possible effects to the Pribilof District blue king crab stock stem from the depressed condition of that stock; the Pribilof District blue king crab stock was declared overfished in 2002 and stock abundance estimates from this year's trawl survey data remain extremely low. Past fishery and trawl survey data have indicated the potential for significant bycatch of blue king crab during a directed fishery on the Pribilof red king crab stock. Precision in the estimates for mature-sized and legal male red king crab males remains poor in 2005: plus-or-minus approximately 60% for the ADF&G CSA estimates and plus-or-minus approximately 120% for the NMFS area-swept estimates. Results from a Pribilof red and blue king crab pot survey and a Pribilof red king crab test fishery conducted by ADF&G in September 2003 validate concerns about potential of bycatch on blue king crab and the poor precision of red king crab abundance estimates. Another ADF&G pot survey of the Pribilof District is being conducted in fall 2005.

Although year-to-year comparisons are problematic due to poor precision of estimates, the time series of estimates indicates that the mature portion of this stock has been in decline since 2001. The 2005 survey provides no expectations for recruitment to the mature-sized or legal-sized males next year; hence mature and legal abundance should be expected to decline through next year due to natural mortality.

Pribilof District blue king crab (*Paralithodes platypus*):

This stock is closed due to being below the threshold for a fishery opening. The stock remains in "overfished" condition for the fourth year in a row. Estimated total mature biomass increased slightly from 0.5 million pounds in 2004 to 1.6 million pounds in 2005; given the low stock level and poor precision of estimates for this stock, the increase in estimated TMB from 2004 to 2005 is not considered significant. The 2005 total mature biomass estimate is 24% of MSST and 12% of the level that needs to be attained for two consecutive years for consideration of a fishery opening. Mature biomass has been in decline for the last 10 years and there is no evidence from this year's survey results that recruitment to the mature stock will occur in the near future. However, for the first time in 10 years a size mode of male and female crabs centered at 55 to 65 mm CL were caught during the 2005 survey. However, those juvenile crabs were largely captured in only one survey haul and at this time it is not clear if these crabs will eventually recruit to the mature and legal size classes.

In October 2004, the BOF adopted a new harvest strategy for blue king crabs in the Pribilof District. The harvest strategy requires that the spawning biomass estimate must exceed 13.2 million pounds for two consecutive years and that a minimum TAC threshold of 0.5 million pounds must be met prior to a fishery opening. The spawning biomass estimate for 2004 was 0.5 million pounds, thus the threshold was not met for a fishery opening in 2005/06. The spawning biomass estimate for 2005 is 1.6 million pounds, thus the threshold is not met for a fishery opening in 2006/07. The fishery has been closed since 1999 because the stock did not exceed the threshold level of abundance. Therefore, this population is declining in the absence of directed fishing pressure and in the absence of any bycatch during the Pribilof red king crab fishery; the Pribilof red king crab fishery has also remained closed since 1999. It is also worth noting that bycatch in trawl fisheries has not occurred due to the Pribilof trawl closure area. The occurrence of juvenile crabs is the first indication in the at least the last 10 years of any potential for future recruitment to the mature portion of the stock.

Saint Matthew Island Section blue king crab (*Paralithodes platypus*):

The fishery has been closed since 1999 and will remain closed in 2005. This stock remains in "overfished" condition for the sixth year in a row since the "overfished declaration" of 1999. Estimated total mature biomass decreased from 7.3 million pounds in 2004 to 5.9 million pounds in 2005, but the reality of year-to-year fluctuations in estimated total mature biomass cannot be judged due to the low precision of the estimates. Total mature biomass would need to increase nearly fourfold to 22.0 million pounds from the 2005 estimate for the stock to be considered "rebuilt." Data from the 2005 survey do not provide any expectations for such an increase in the near-term future; the estimates from 1999 through 2005 indicate at best only a weakly increasing trend in total mature biomass. As in previous years, the stock is estimated to be above the threshold for a fishery opening, but with the TAC computed according to the fishery harvest strategy far below the minimum TAC of 2.5 million pounds.

Crab Stocks With No Annual Survey

Stock status for the following stocks are unknown due to a lack of survey data: Pribilof District golden king crab (*Lithodes aequispinus*); Saint Lawrence Island blue king crab; Northern District golden king crab;

Aleutian Islands golden king crab; Western Aleutian Tanner crab *(C. bairdi*); Aleutian Islands (AI) scarlet king crab (*Lithodes couesi*); Bering Sea triangle Tanner crab (*Chionoecetes angulatus*); Eastern AI triangle Tanner crab; Eastern AI grooved Tanner crabs (*Chionoecetes tanneri*); Western AI grooved Tanner crabs and Bering Sea grooved Tanner crabs. The fisheries for the species identified in Table 3 occur under authority of an ADF&G commissioner's permit. Estimation of MSST for these stocks is not possible at this time because of insufficient data on the basic stock abundance.

Table 2. 2005/2006 Total allowable catch, or guideline harvest level, fishery status, and MSY estimates for BSAI king and Tanner crab stocks that are surveyed on a limited basis.

Stock	TAC/GHL (millions of pounds)	Fishery/Season	MSY (millions of pounds)
WAI red king	Closed	10/15	1.5
EAI red king	Closed	Closed	NA
Norton Sound red king	0.37 (GHL)	6/1	0.5
Saint Lawrence blue king	None established	Permit	0.1
AI golden king	5.7 (TAC)	8/15	15.0
Pribilof golden king	0.15 (GHL)	Permit	0.3
Northern District golden king	0.01-0.02 (GHL)	Permit	0.3
AI scarlet king	Incidental harvest	Permit	NA
EBS scarlet king	Incidental harvest	Permit	NA
EAI Tanner	Stock status determ. pending	1/15	0.7
WAI Tanner	Closed	Closed	0.4
EAI triangle Tanner	Incidental harvest	Permit	1.0
EBS triangle Tanner	Incidental harvest	Permit	0.1
EAI grooved Tanner	0.05-0.2 (GHL)	Permit	1.8
EBS grooved Tanner	0.05-0.2 (GHL)	Permit	1.5
WAI grooved Tanner	Incidental harvest	Closed	0.2

NA: Indicates that insufficient data exists to generate an estimate.

Aleutian Islands red king crab: WAI (Adak or Petrel Bank) and EAI (Dutch Harbor). The GHL for the eastern portion is based on the results of surveys performed by ADF&G on a triennial basis; the most recent survey was performed in 2004. Few red king crabs have been caught in surveys of the eastern Aleutians since 1995. The eastern portion has been closed since 1983. Historically, the GHL for the western portion has been based on the most recent fishery performance. The western portion was closed for the 1996/97 and 1997/98 seasons due to poor performance and poor signs of recruitment during the 1995/96 season. The western portion was reopened for limited exploratory fishing in some areas in 1998/99. Based on the results of the 1998/99 season, the fishery in the western portion was closed in 1999/2000.

In 1999 the Crab Plan Team identified the need for standardized surveys in areas of historical production prior to reopening the fishery in the western portion; prior to that meeting, the western portion had not been surveyed since 1977. A cooperative ADF&G-Industry pot survey was performed in the Petrel Bank area under the provisions of a permit fishery in January-February and November of 2001. Results of those surveys showed high densities of legal crabs within limited portions of the surveyed area. Survey catches of females and prerecruit sized males were low. Based on results of the 2001 surveys and recommendations from ADF&G and the public, the Alaska Board of Fisheries adopted pot limits, and modified the season opening date.

A GHL of 0.5 million pounds was set for the 2002 season in the Petrel Bank area. Because only relative abundance information is available, ADF&G monitored the fishery utilizing inseason catch data. The management goal is to maintain a fishery CPUE of at least 10 legal crabs per pot lift. The 2002 fishery in the

Petrel Bank area harvested 505,000 pounds. The fishery CPUE was 18 legal crabs per pot lift. Based on fishery performance, ADF&G announced a 0.5 million pound GHL for the 2003 fishery and the fleet harvested 479,000 pounds. The 2003 catch rate dropped to 10 legal crabs per pot lift. The fishery was closed in 2004 and the 2005 Petrel Bank red king crab fishery will not open due to low stock size. An additional pot survey is planned for 2006.

In order to assess red king crab in other portions of the western AI, during November 2002, a survey was conducted between 172° W longitude, and 179° W longitude (waters in the vicinity of Adak, Atka, and Amlia Islands). The survey of these waters yielded very few red king crabs and the area will remain closed until further notice.

Norton Sound red king crab: The ADF&G length-based population model estimated legal male crab abundance for the 2005 summer commercial crab fishery at 6.2 million pounds. This is up 29% from the 2004 estimated legal male crab abundance of 4.4 million pounds. Current size composition data from the 2005 winter pot study indicates that the portion of the crab population classified as recruits has decreased 11.7% since the 2004 winter survey, but the post recruit male crab population has increased 20.2%. Applying the regulatory harvest strategy and an 8% exploitation rate on the legal male population over 5 inch CW produced a guideline harvest level of 370,000 pounds. The winter pot study showed a below average prerecruit-1 crab population that will molt and become part of the legal population next year. It also showed a very small number of prerecruit-2 crab and prerecruit-3 crab. These results suggest that the legal crab population has peaked and may decrease in 2006 and 2007. By regulation, the Community Development Quota (CDQ) fishery is allocated 7.5% of the summer season harvest and the CDQ harvest quota was set at 27,750 pounds preseason.

Aleutian Islands golden king crab (Eastern Aleutian Islands and Western Aleutian Islands golden king crab stocks): A standardized triennial pot survey for golden king crab in a portion of the eastern Aleutian Islands (in the vicinity of Amukta, Chagulak, and Yunaska Islands) was initiated in 1997. Survey results and tag recovery data indicate that catch per unit effort (CPUE) of legal male crabs in the area surveyed has declined since 1997. Analysis of 1996-2003 golden king crab fishery performance and observer data from the entire area east of 174° W longitude indicate that the golden king crab stock has remained stable in that larger area, however ADF&G observer data indicates a continued decline since 2000, in the catch of sublegal male golden king crabs. The 2005-06 TAC for the Aleutian Islands has again been set at 5.7 million pounds, with 2.7 million pounds for the area west of 174° W longitude, and 3.0 million pounds for the area east of 174° W longitude.

Eastern Aleutian Islands Tanner crab: ADF&G surveys a portion of the eastern Aleutian Islands Tanner crab stock triennially. Improved trawl survey catches prompted ADF&G to conduct a pot survey of the Unalaska Bay, Makushin Bay, and Akutan Bay areas in 2003. Based on trawl survey data, ADF&G developed threshold levels of abundance to be met prior to a fishery opening and set 2005 GHLs of 35,304 pounds for Unalaska Bay and 171,453 pounds for Makushin Bay. In early December 2004 the vessel Selendang Ayu went aground near Skan Bay spilling several hundred thousand gallons of fuel. Subsequently the a threatened water body determination was made for Skan and Makushin Bays and ADF&G closed that are to commercial fishing prior to the opening of the Tanner crab fishery. ADF&G currently intends to survey the Unalaska Bay, Makushin Bay and Akutan Bay Tanner crab populations annually and a survey was conducted in August 2005, however a stock status determination has not yet been made for the 2006 fishery.

Overfishing Parameters

The FMP identifies the following overfishing definitions to provide objective and measurable criteria for identifying when the BSAI crab fisheries are overfished or overfishing is occurring, as required by the Magnuson-Stevens Fishery Conservation and Management Act. Table 3 provides the MSST, MSY, OY and maximum fishery mortality threshold (MFMT) control rule estimates for the BSAI king and Tanner crab stocks. The Crab Plan Team is currently studying revisions to the Overfishing Definitions.

Table 3. MSST, MSY, OY, and the MFMT values for BSAI king and Tanner crabs. Values in millions of pounds.

Stock	MSST	MSY	OY range	MFMT
WAI red king	NA	1.5	0-1.5	0.2
Bristol Bay red king	44.8	17.9	0-17.9	0.2
EAI red king	NA	NA	NA	0.2
Pribilof Islands red king	3.3	1.3	0-1.3	0.2
Norton Sound red king	NA	0.5	0-0.5	0.2
Pribilof Islands blue king	6.6	2.6	0-2.6	0.2
Saint Matthew blue king	11.0	4.4	0-4.4	0.2
Saint Lawrence blue king	NA	0.1	0-0.1	0.2
Aleutian Islands golden king	NA	15.0	0-15.0	0.2
Pribilof Islands golden king	NA	0.3	0-0.3	0.2
Northern District golden king	NA	0.3	0-0.3	0.2
Aleutian Islands scarlet king	NA	NA	NA	0.2
EBS scarlet king	NA	NA	NA	0.2
Total king crab		**43.9**	**0-43.9**	
Eastern Aleutian Tanner	NA	0.7	0-0.7	0.3
EBS Tanner	94.8	56.9	0-56.9	0.3
Western Aleutian Tanner	NA	0.4	0-0.4	0.3
Total Tanner		**58.0**	**0-58.0**	
EBS snow	460.8	276.5	0-276.5	0.3
Total snow		**276.5**	**0-276.5**	
Eastern Aleutian triangle Tanner	NA	1.0	0-1.0	0.3
EBS triangle Tanner	NA	0.3	0-0.3	0.3
Eastern Aleutian grooved Tanner	NA	1.8	0-1.8	0.3
EBS grooved Tanner	NA	1.5	0-1.5	0.3
Western Aleutian grooved Tanner	NA	0.2	0-0.2	0.3
Total other Tanner		**4.8**	**0-4.8**	

NA: Indicates that insufficient data exists to calculate value.

Maximum sustainable yield (MSY) is the largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological and environmental conditions. MSY is estimated from the best information available. Proxy stocks are used for BSAI crab stocks where insufficient scientific data exists to estimate biological reference points and stock dynamics are inadequately understood. MSY for crab species is computed on the basis of the estimated biomass of the mature portion of the male and female population or total spawning biomass (SB) of a stock. A fraction of the *SB* is considered sustained yield (*SY*) for a given year and the average of the *SY*s over a suitable period of time is considered the MSY.

Overfishing and Overfished: The term “overfishing” and “overfished” mean a rate or level of fishing mortality that jeopardizes the capacity of a fishery to produce MSY on a continuing basis. Overfishing is defined for king and Tanner crab stocks in the BSAI management area as any rate of fishing mortality in excess of the maximum fishing mortality threshold, F_{msy}, for a period of 1 year or more. Should the actual size of the stock in a given year fall below the minimum stock size threshold, the stock is considered overfished. If a stock or stock complex is considered overfished or if overfishing is occurring, the Secretary will notify the Council to take action to rebuild the stock or stock complex.

MSY control rule means a harvest strategy which, if implemented, would be expected to result in a long-term average catch approximating MSY. The MSY control rule for king and Tanner crabs is the mature biomass of a stock under prevailing environmental conditions, or proxy thereof, exploited at a fishing mortality rate equal to a conservative estimate of natural mortality. Sustainable yield (SY) in a given year is the MSY rule applied to the current spawning biomass. Overfishing occurs if the SY is exceeded for one year or more.

MSY stock size is the average size of the stock, measured in terms of mature biomass of a stock under prevailing environmental conditions, or a proxy thereof. It is the stock size that would be achieved under the MSY control rule. It is also the minimum standard for a rebuilding target when remedial management action is required. For king and Tanner crab, the MSY stock size is the average mature biomass observed over the 15 year period from 1983 to 1997.

Maximum fishing mortality threshold (MFMT) is defined by the MSY control rule, and is expressed as the fishing mortality rate. The MSY fishing mortality rate $F_{msy} = M$, is a conservative natural mortality value set equal to 0.20 for all species of king crab, and 0.30 for all *Chionoecetes* species.

Minimum stock size threshold (MSST) is whichever is greater: one half the MSY stock size, or the minimum stock size at which rebuilding to the MSY level would be expected to occur within 10 years if the stock or stock complex were exploited at the maximum fishing mortality threshold. The minimum stock size threshold is expressed in terms of mature biomass of a stock under prevailing environmental conditions, or a proxy thereof

Management Programs

Crab Rationalization Program

In the late 1990's, industry representatives initiated efforts to develop a rationalization program for BSAI crab fisheries. Rationalization includes the use of quota based management to improve economic efficiency and address other social and biologic goals such as improving safety and maintaining catch below harvest limits. In June 2001, with the direction of Congress and the industry, the Council identified alternatives with specific elements to rationalize BSAI crab fisheries. Over the course of several years the Council analyzed various rationalization alternatives. In April 2003, the Council selected a preferred alternative and recommended NMFS implement that alternative. This alternative was subsequently amended in June 2004.

In January 2004, Congress amended section 313 of the Magnuson-Stevens Act through the Consolidated Appropriations Act of 2004 (Pub. L. No. 108-199, section 801), by adding paragraph (j). As amended, section 313(j)(1) required the Secretary to approve by January 1, 2005, and implement thereafter, the BSAI Crab Rationalization Program (Program) as recommended by the Council. The Council designed the Program to replace the existing License Limitation Program for all major BSAI crab fisheries with a quota based management system. The fisheries managed under the Program include: Eastern and Western Aleutian Island golden king crab; Bristol Bay red king crab; Pribilof District red and blue king crab; Saint Matthew Island Section blue king crab; Bering Sea snow crab; and Bering Sea Tanner crab. NMFS approved the Program on November 19, 2004 through the publication of the notice of availability to amend the Fishery Management Plan for BSAI king and Tanner crab. NMFS published a proposed rule on October 29, 2004 (69 FR 63200) to implement the Program and gathered public comments. NMFS reviewed and incorporated public comments to the proposed rule and published a final rule to implement the Program on March 2, 2005 (70 FR

10174). This final rule became effective on April 1, 2005.

The Program is a limited access system that balances the interests of several groups with interests in these fisheries. The Program addressed conservation and management issues associated with the derby fishery. The Program may reduce bycatch and associated discard mortality and increase the safety of crab fishermen by ending the race for fish. The Program allocates shares to harvesters and processors based on historic harvesting and processing activity. It is designed to increase efficiencies, provide economic stability, and facilitate compensated reduction of excess capacities in the harvesting and processing sectors.

The Program distributes a long-term harvesting privilege, quota share (QS), that yields an annual allocation – individual fishing quota (IFQ) based on the total allowable catch (TAC) for that year. The Program allocates a long term processing privilege, processor quota share (PQS), that yields annual processing privileges – individual processing quota (IPQ) for a portion of the annual IFQ that is delivered onshore. The Program includes incentives to participate in fishery cooperatives. The Program was designed to protect community interests through: increasing Community Development Quota (CDQ) allocations; establishing allocations to an entity representing the community of Adak; requiring regional landing provisions; and designating specific communities as eligible to purchase QS and lease the resulting IFQ for use by their residents. Additionally, the Program contains mechanisms to address price and delivery concerns through the establishment of a contractually-based arbitration system for IFQ holders who are required to match their IFQ harvest to processors with IPQ.

Applications to receive QS and PQS were due on June 3, 2005. Eligible QS or PQS share holders that applied in a timely fashion received QS or PQS. Each year on August 1, QS and PQS holders must apply to receive IFQ and for the coming crab fishing year. The crab fishing year begins July 1 and ends on June 30 of the following calendar year. The Board of Fisheries selects specific crab fishing seasons for each crab fishery during this crab fishing year.

Community Development Quota and Adak Community Allocation Crab Fisheries

The Magnuson-Stevens Act mandates that the Council and NMFS establish a Community Development Quota (CDQ) program under which a percentage of the total allowable catch for Bering Sea and Aleutian Island crab fisheries is allocated to the CDQ program (16 U.S.C. 1855 (i)(1)(A)). The Council and NMFS deferred management authority of the BSAI king and Tanner crab fisheries, including the CDQ fisheries, to the State, within the FMP framework. The FMP specifies three categories of management measures, which provide the framework for Federal/State management of the crab fisheries, including the determination of the TACs and fishery seasons. Additionally, the FMP authorizes the State to recommend allocations of the crab CDQ reserve among CDQ groups and to manage crab harvesting activity of the BSAI CDQ groups (§8.1.4.2 of the FMP).

Sixty-five communities located along the Bering Sea are eligible for the CDQ program. These communities are aligned into six CDQ groups: Aleutian Pribilof Island Community Development Association (APICDA), Bristol Bay Economic Development Corporation (BBEDC), Central Bering Sea Fishermen's Association (CBSFA), Coastal Villages Regional Fund (CVRF), Norton Sound Economic Development Corporation (NSEDC), and Yukon Delta Fisheries Development Association (YDFDA). The legislation that implemented the BSAI crab rationalization program (Pub. L. No. 108-199, section 801) specified a CDQ reserve of 10.0 % of the TAC for the crab fisheries assigned to the program. Additionally, the legislation assigned the Eastern Aleutian Island golden king crab fishery to the CDQ program. The following BSAI crab fisheries are assigned to the CDQ program: Eastern Aleutian Island golden king crab; Bristol Bay red king crab; Pribilof District red and blue king crab; Norton Sound red king crab; Saint Matthew Island Section blue king crab; Bering Sea snow crab; and Bering Sea Tanner crab.

The State of Alaska recommends allocation of the 10.0 % CDQ reserve among the six CDQ groups through a triennial allocation process. NMFS reviews and must approve the State's recommendations. The allocations for 2006-2008 timeframe have not yet been submitted by the State to NMFS. NMFS is extending the 2003-2005 allocations until the State submits new recommendations and they are approved by NMFS. Allocations recommended by the State of Alaska are subject to appeal by affected CDQ groups. This appeal process is managed by NMFS.

Table 4. 2003-2005 CDQ percent allocation by group.

Fishery	APICDA	BBEDC	CBSFA	CVRF	NSEDC	YDFDA
Bristol Bay red king	17	19	10	18	18	18
Pribilof Islands king	0	0	100	0	0	0
Saint Matthew blue king	50	12	0	12	14	12
Norton Sound red king	0	0	0	0	50	50
EBS Tanner	10	19	19	17	18	17
EBS snow	8	20	20	17	18	17
EAI golden king	N/A	N/A	N/A	N/A	N/A	N/A

Table 5. 2005/2006 CDQ reserve by fishery.

Fishery	CDQ reserve
Bristol Bay red king	1.8 million pounds
Pribilof Islands king	Closed
Saint Matthew blue king	Closed
Norton Sound red king	0.028 million pounds
EBS Tanner	0.16 million pounds
EBS snow	3.7 million pounds
EAI golden king	0.3 million pounds

The legislation implementing the BSAI crab rationalization program (Pub. L. No. 108-199, section 801) allocated 10.0 % of the Western Aleutian Island golden king crab fishery to an entity representing the community of Adak. This allocation is managed similar to allocations made under the CDQ program – ADF&G will establish criteria for the oversight and use of the allocation in coordination with NMFS. The entity representing Adak has been established and authorized by NMFS.

License Limitation Program

Fishing under the crab license limitation program (LLP) began in January 2000. The goal of the LLP is to limit access to the crab fisheries to the historic participants or to persons who purchase licenses from historic participants. NMFS issued licenses based on fishing history during a general qualifying period, with area/species endorsements based on additional qualifying periods for each species by area. The LLP also required fishing history during a specific recent qualifying period. Licenses also limit the size of the vessel deployed under the license. Interim licenses were issued to any applicant that had a valid moratorium qualification for crab in 1999. Interim licenses are temporary and the total numbers of licenses will change as the interim licenses are either approved or denied. Interim licenses are issued if any part of a person's claim is contested.

The implementation of the BSAI crab rationalization program replaced the LLP requirements for major BSAI crab fisheries. An LLP is still required for a person to fish minor BSAI fisheries including: Eastern Aleutian Island red king crab; Aleutian Islands Tanner crab; Bering Sea golden king crab; Norton Sound red and blue king crab; grooved and triangle Tanner crab; and scarlet king crab.

American Fisheries Act Crab Sideboards

In 1998, Congress passed the American Fisheries Act (AFA) to establish a new allocation program for the BSAI pollock fishery. The AFA placed harvest restrictions (commonly known as "sideboards") on the pollock fishers who received exclusive harvesting privileges under the AFA to protect the interests of fishers not directly benefited by the AFA.

With the implementation of the BSAI crab rationalization program, the AFA sideboards were removed. BSAI crab harvests are now managed on a quota based system and sideboards are not required to limit harvests to protect other harvesters as is necessary under a derby style fishery. Owners of AFA qualified vessels are limited to harvests based on any quota holdings they may have.

Capacity Reduction Program

Pursuant to Section 144(d) of Public Law 106-554 (section 144), as amended by Public Law 107-20, NMFS is in the process of implementing a capacity reduction program for the BSAI crab fisheries, excluding Norton Sound. NMFS published the proposed rule on December 12, 2002 (67 FR 76329) and the final rule on December 12, 2003 (68 FR 69331) to implement the program. Section 144 mandates a specific capacity reduction program. The objective of the program is to permanently remove harvesting capacity from the BSAI crab fisheries by permanently reducing the number of crab LLP licenses issued to vessel owners. The action is necessary because the BSAI crab fisheries are over capitalized. The program will: 1) prevent certain crab vessels from fishing again anywhere in the world; 2) revoke the crab LLP licenses based on the vessels' fishing history; 3) revoke any NMFS issued non-crab licenses that the vessels' owners hold; and, 4) revoke the vessels' fishing histories upon which NMFS based the licenses to be revoked. These revoked LLP licenses are not eligible to receive QS under the BSAI crab rationalization program.

The vessels and fishing histories relinquished under the program were selected through a competitive bid process administered by NMFS. The bidding period opened, on August 6, 2004. This bidding period closed on September 24, 2004. Fifty five, non-interim, crab license holders submitted bids totaling $225,954,284. NMFS accepted 25 bids. These totaled $97,399,357. The next lowest scoring bid would have exceeded the program's $100 million maximum cost. The accepted bids involved 25 fishing vessels and 62 fishing licenses or permits. The capacity reduction program required a referendum among qualified LLP holders to approve the buyback of catch history. In November 2004, qualified LLP holders in the BSAI crab fishery voted to approve a 30-year federal loan to pay 25 of their competitors to withdraw their vessels from fishing and relinquish both their fishing licenses and fishing histories. 273 of the 313 qualified voters cast timely ballots, with 80% approving the buyback's industry fee system.

NMFS published a reduction payment tender notice in the Federal Register November 24, 2004. The bidders' fishing licenses and fishing histories were revoked and their vessels permanently restricted from fishing worldwide on December 27, 2004. The agency completed making payments to the 25 accepted bidders on January 19, 2005.

Fishermen remaining in the Bering Sea and Aleutian Island crab fishing industry will pay back the $97.4 million federal loan with a fee on future crab landings. NMFS published a proposed rule to implement the fee collection system to repay the federal loan on July 28, 2005 (70 FR 43673). A final rule to implement the industry fee collection system a final rule is under development.

History Relative to Overfishing for the Surveyed Stocks

September 25, 2005

R. S. Otto

DRAFT: After Crab Plan Team Meeting, Sept. 7-9, 2005, included new calculations of area-swept biomass

Status of Surveyed EBS King, Tanner and Snow Crab Stocks relative to FMP Overfished Levels in 2005.

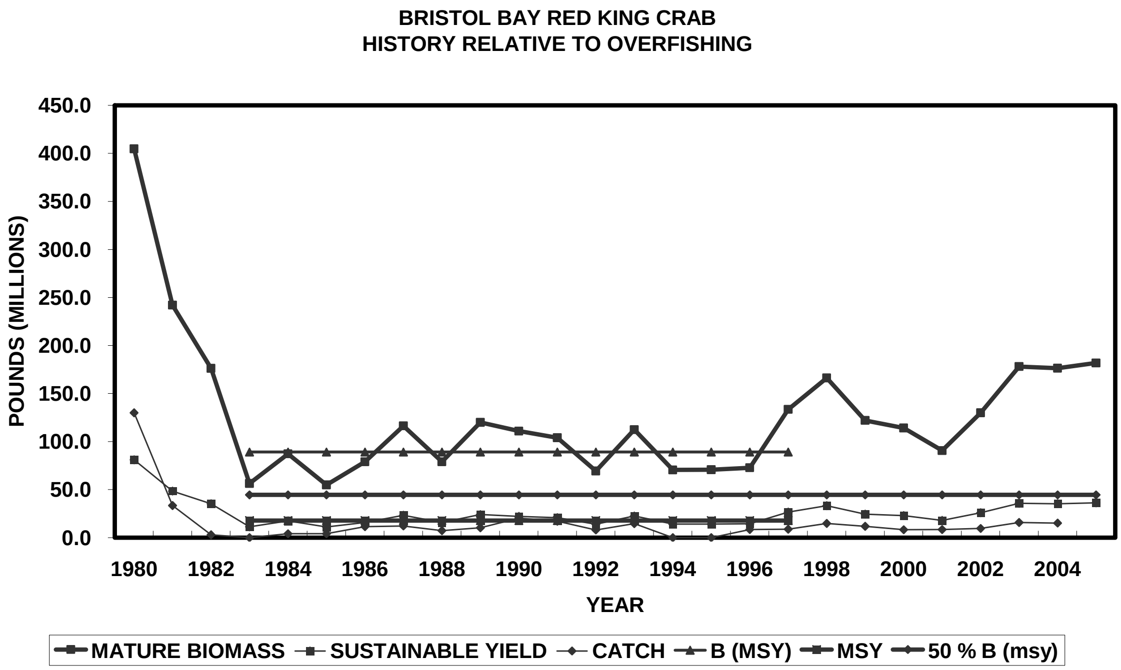
General Notes: The following documents survey based computations to date. These calculations include revisions to the database that were necessitated by the deletion of three tows due to unsatisfactory performance that occurred after the plan team met. Changes detailed below did not change the overfishing category for any stock. The most important changes relative to the previous draft are:

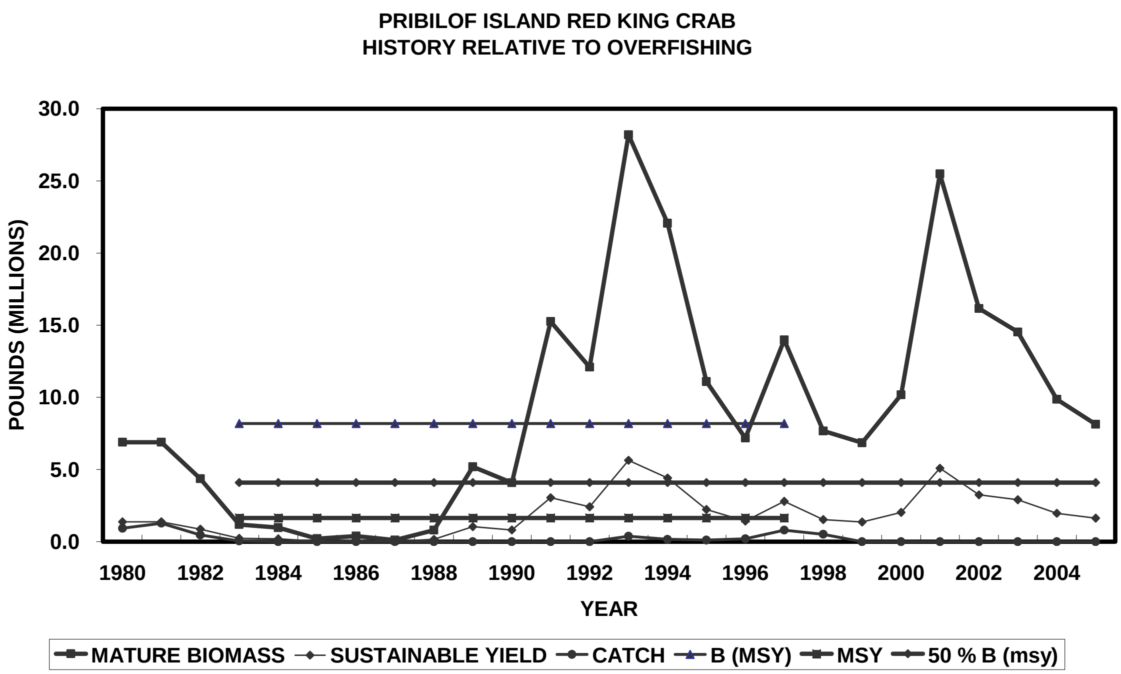
1) A considerable decrease in the estimate for St Mathew Island Blue King Crab Stock (one of the deleted tows contained ca 30% of the survey catch).
2) A decrease in the biomass of opilio due to confining the estimate to the historically (1979-2002) surveyed area rather than the enlarged survey area of 2005.

We are still in the process of revising our long term data series, so the diagrams below will change slightly in the future. Never the less, overfished levels or minimum stock size thresholds (MSST = 50 % B_{msy}) in the FMP are fixed values. It is most important, at this juncture, to consider the level of total mature biomass (TMB) relative to the overfished levels in the plan and with respect to various rebuilding plans. Here I simply present the calculations as a first step in the process of determining the status of these stocks in these regards.

Stock	FMP Overfished Level (millions lbs)	Current Survey TMB (millions lbs)	+/- %
Bristol Bay Red King Crab	44.8	181.9	+ 306
Pribilof Is. Red King Crab	3.3	8.1	+ 147
Pribilof Is. Blue King Crab	6.6	1.6	- 75
St. Matthew Is. Blue King Crab	11.0	5.9	- 46
EBS Tanner Crab	94.8	162.0	+ 71
EBS Snow Crab	460.8[1]	610.7	+ 33

[1] This value was inadvertently omitted from the plan and is taken from the Regulatory Impact review.


BRISTOL BAY RED KING CRAB
HISTORY RELATIVE TO OVERFISHING
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
POUNDS (MILLIONS)
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
YEAR
MATURE BIOMASS
SUSTAINABLE YIELD
CATCH
B (MSY)
MSY
50 % B (msy)


PRIBILOF ISLAND RED KING CRAB
HISTORY RELATIVE TO OVERFISHING
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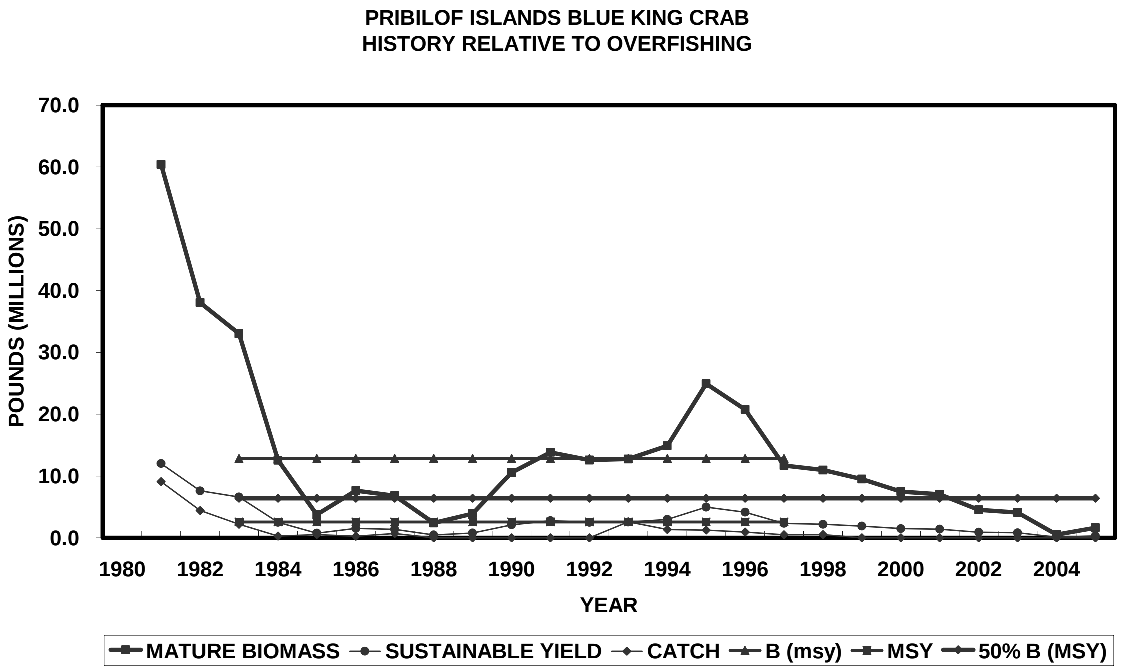
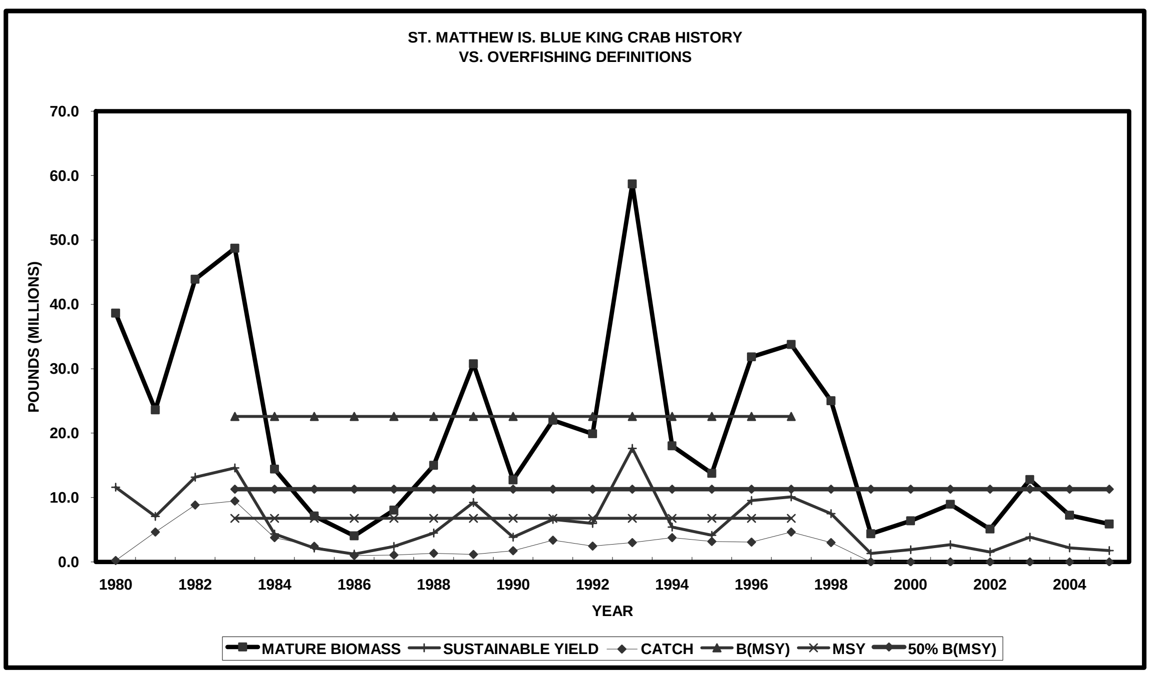
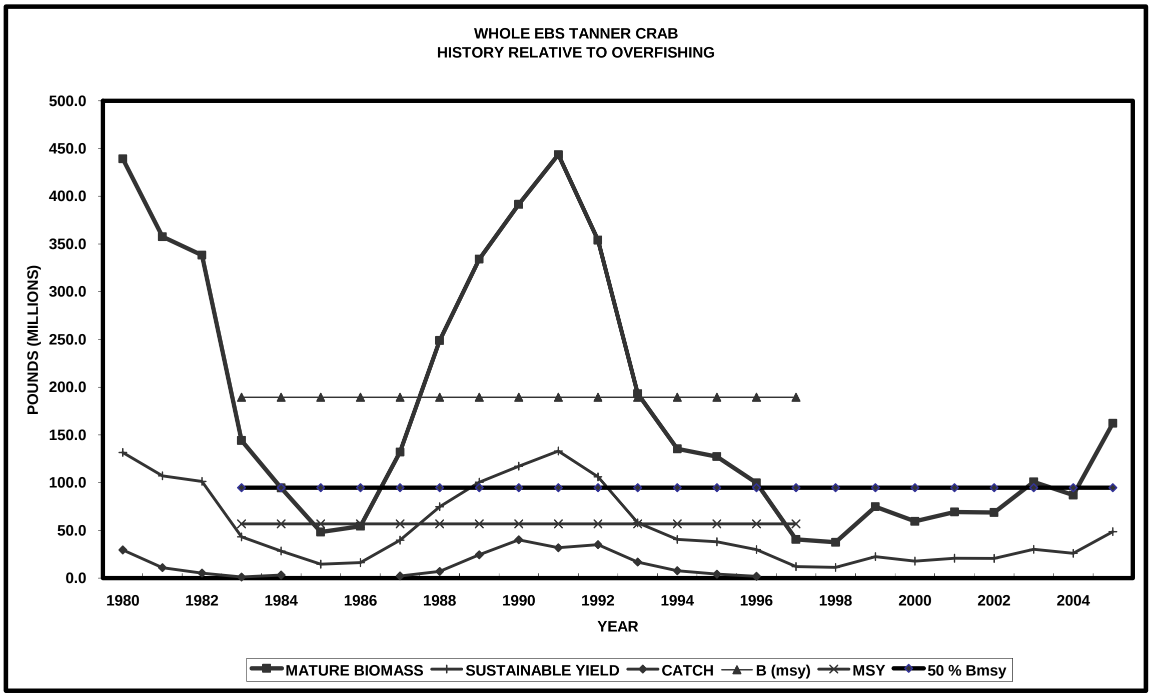
25.0
20.0
15.0
10.0
5.0
0.0
POUNDS (MILLIONS)
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
YEAR
MATURE BIOMASS
SUSTAINABLE YIELD
CATCH
B (MSY)
MSY
50 % B (msy)


PRIBILOF ISLANDS BLUE KING CRAB
HISTORY RELATIVE TO OVERFISHING
POUNDS (MILLIONS)
YEAR
MATURE BIOMASS
SUSTAINABLE YIELD
CATCH
B (msy)
MSY
50% B (MSY)


ST. MATTHEW IS. BLUE KING CRAB HISTORY
VS. OVERFISHING DEFINITIONS
POUNDS (MILLIONS)
YEAR
MATURE BIOMASS
SUSTAINABLE YIELD
CATCH
B(MSY)
MSY
50% B(MSY)


WHOLE EBS TANNER CRAB
HISTORY RELATIVE TO OVERFISHING
POUNDS (MILLIONS)
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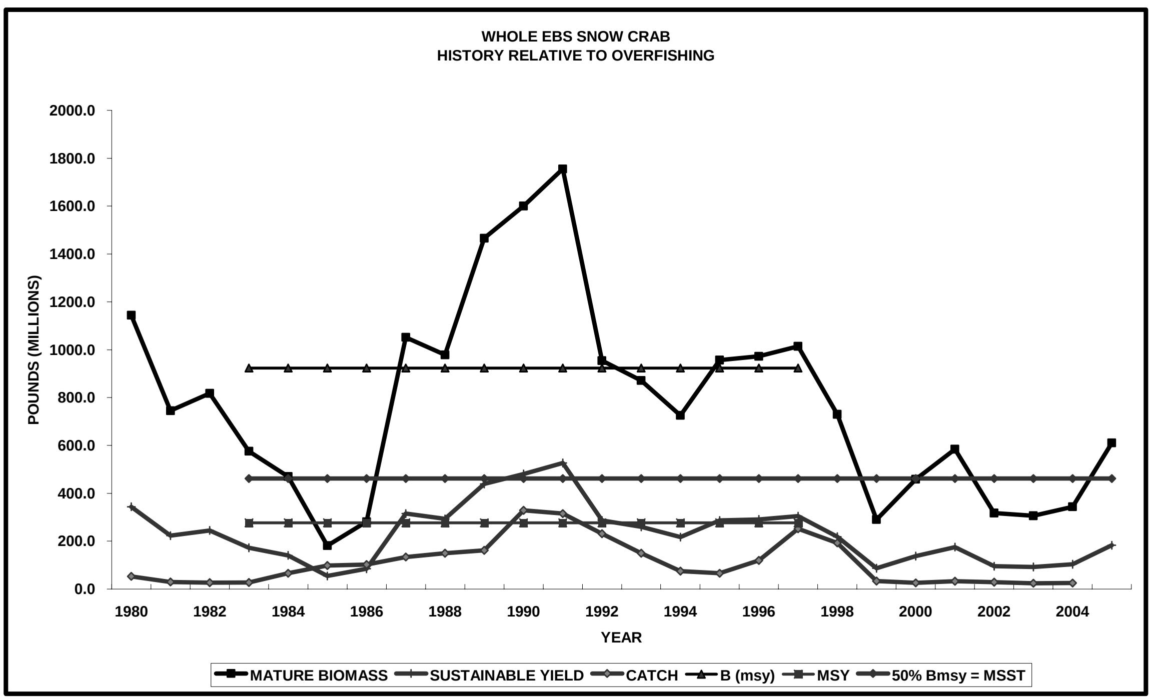
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004
YEAR
MATURE BIOMASS
SUSTAINABLE YIELD
CATCH
B (msy)
MSY
50 % Bmsy


WHOLE EBS SNOW CRAB
HISTORY RELATIVE TO OVERFISHING
POUNDS (MILLIONS)
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1800.0
1600.0
1400.0
1200.0
1000.0
800.0
600.0
400.0
200.0
0.0
1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004
YEAR
MATURE BIOMASS
SUSTAINABLE YIELD
CATCH
B (msy)
MSY
50% Bmsy = MSST

RESULTS OF THE 2005 NMFS BERING SEA CRAB SURVEY
EXECUTIVE SUMMARY

This document summarizes data to be presented in the Report to Industry on the 2005 Eastern Bering Sea Trawl Survey. Numbers presented are trawl survey indices of population level and do not necessarily represent absolute abundance. In 2004 and 2005 the survey area was expanded to the north for better coverage of the snow crab stock. Data from these additional tows are not included in the estimates below. The estimates below are based on the same areas that were surveyed in 2003 and prior years. Data from the additional tows in 2004 and 2005 will be presented in the final version of the Report to Industry.

For further information, contact Dr. Lou Rugolo, or Dr. Robert Otto, NMFS, P.O. Box 1638, Kodiak, AK 99615. Phone (907) 481-1700. GHLs (Guideline Harvest Levels) are for the combined open-access and CDQ fisheries. This draft reflects data analysis and management decision making through September 28, 2005.

Red king crab (*Paralithodes camtschaticus*) Bristol Bay.

Legal males:	10.0 million crabs; 22% decrease.
Pre-recruits:	16.2 million crabs; 58% increase.
Large females:	42.7 million crabs; 35% increase.
Synopsis:	Abundance legal males was essentially stable. Abundance of pre-recruit males and mature females increased considerably and the stock as a whole may be considered stable. Almost all new shell females carried new eggs. Reproductive population estimates are well above the minimum stock size threshold (MSST), the stock is not considered to be in the overfished level of abundance although it remains far below the peak population levels of the 1970s.
GHL:	18.3 million pounds (8.300 metric tons, t). Fishery opens October 15, 2005.

Red king crab (*Paralithodes camtschaticus*) Pribilof District.

Legal males:	0.3 million crabs; 69% decrease, low reliability.
Pre-recruits:	0.02 million crabs; vs. 0.0 last year, low reliability.
Large females:	1.3 million crabs; 129 % increase, low reliability.
Outlook:	Crabs are highly concentrated, and indices have very low precision. Reproductive population estimates are above the MSST, the stock is not considered to be in the overfished level of abundance. No future recruitment is apparent. Red king crabs in the Pribilof Islands have been historically harvested along with blue king crabs and are currently the dominant of the two species. There are concerns as to the low reliability of estimates and that unacceptable levels of blue king crab incidental catch could occur in a red king crab fishery.
GHL:	Fishery will not open in 2005.

Pribilof Islands blue king crab *(P. platypus)* Pribilof District.

Legal males:	0.1 million crabs; 45 % decrease.
Pre-recruits:	0.0 million crabs; 100 % decrease.
Large females:	0.3 million crabs; 68 % decrease.
Outlook:	Population is low and trends are not easily detectable. Little or no recruitment is apparent. Nearly the lowest total population estimates on record. Reproductive population estimate, which fell below the MSST in 2002, 2003 and 2004, remains so in 2004. The stock is considered to be in the overfished level of abundance.
GHL:	Fishery will not open in 2005.

St. Matthew blue king crab *(P. platypus)* Northern District.

Legal males:	0.3 million crabs; 53% decrease, no real change.
Pre-recruits:	0.6 million crabs; 159 % increase, no real change.
Large females:	0.2 million crabs; 4% decrease. Not well estimated.
Outlook:	Indices are affected by the portion of the stock occupying untrawlable grounds. This year's estimate affected by torn nets. Population declined steeply in 1999 and fell below the MSST. Reproductive population estimates continued to be below the MSST through 2002, but rose just above MSST in 2003 only to fall below again in 2004 and 2005. The stock continues to be in the overfished level of abundance. The picture is clouded by large uncertainty in female abundance.
GHL:	Fishery will not open in 2005.

Tanner crab (*Chionoecetes bairdi*) Eastern District.

Legal males:	11.4 million crabs; 112% increase.
Pre-recruits:	52.0 million crabs; 60% increase.
Large females:	11.6 million crabs; 150% increase.
Outlook:	Population indices increasing but estimates are uncertain. Reproductive population estimate was below the MSST from 1997-2002 and just barely above it in 2003, again fell below MSST in 2004 but rose considerably above MSST in 2005. As of 2005 this fishery is being managed in two segments, east and west of 166 degrees West. Threshold criteria were not met east of 166 degrees but a small fishery will occur west of 166 degrees.
GHL:	1.6 million pounds (730 metric tons, t). Fishery opens October 15, 2005.

Snow crab (*C. opilio*) All Districts combined.

Large males:	72.1 million crabs; 5% increase.
Pre-recruits:	356.2 million crabs; 236% increase.
Large females:	1.631 million crabs; 102% increase.
Outlook:	Large males stable but pre-recruit males increased substantially along with large females. Apparently increasing recruitment at the lower end of the mature size range has increased spawning biomass to levels above MSST in 2005 but the stock is still well below average. Reproductive population estimates that slightly exceeded MSST in 2001 were well below the MSST in 2002, 2003 and 2004. Under the current rebuilding plan and harvest strategy the fishery would be closed if the stock fell below 50% MSST.
GHL:	37.2 million pounds (16,900 t). Fishery opens October 15, 2005.

Overview of Guideline Harvest Levels and Actual Harvests from BSAI Crab Fisheries (1993-2004)

Compiled by staff of AGF&G

Table 1. Combined general and CDQ fishery harvest and guideline harvest levels for major Bering Sea/Aleutian Islands king and Tanner crab fisheries during the 2004/2005 seasons.

Fishery	GHL[a]	Harvest[a]
Aleutian Islands red king crab (Petrel Bank, 2004)	Fishery Closed	
Aleutian Islands golden king crab (2004-2005)	5.7	5.58
Bering Sea snow crab (2005)	20.9	24.75
Bering Sea Tanner crab (2004)	Fishery Closed	
Bristol Bay red king crab (2004)	15.4	15.30
Pribilof Islands red king crab (2004)	Fishery Closed	
Pribilof Islands blue king crab (2004)	Fishery Closed	
Saint Matthew Island blue king crab (2004)	Fishery Closed	

[a] Millions of pounds.

Table 2. Western Aleutian Islands red king crab fishery harvest (thousands of pounds) relative to guideline harvest level (GHL; thousands of pounds), 1993/94 season to 2003/2004 season.

Season	GHL	Harvest
1993/94	None	698.1
1994/95	None	197.0
1995/96	None	38.9
1996/97	Fishery closed	
1997/98	Fishery closed	
1998/99	15.0	5.9
1999/00	Fishery closed	
2000/01	Fishery closed	
2001/02	Fishery closed	
2002/03	500.0[a]	505.6[a]
2003/04	500.0[a]	479.1[a]
2004/05	Fishery closed	

[a] Petrel Bank only.

Table 3. Aleutian Islands golden king crab fishery harvest (millions of pounds) relative to guideline harvest level (GHL; millions of pounds), 1993/94 season to 2004/2005 season.

Season	GHL	Harvest
1993/94	None	5.55
1994/95	None	8.13
1995/96	None	6.89
1996/97	5.9	5.85
1997/98	5.9	5.95
1998/99	5.7	4.94
1999/00	5.7	5.84
2000/01	5.7	6.02
2001/02	5.7	5.89
2002/03	5.7	5.46
2003/04	5.7	5.67
2004/05	5.7	5.58

Table 4. Eastern Bering Sea snow crab fishery harvest relative to harvest strategy target and guideline harvest level (GHL), 1994-2005.

Fishery Year	Harvest Strategy Target[a]	Actual[b]	Mature Male Biomass[c]	GHL[d]	Harvest[e]
1994	N/A[f]	36.3%	412.3	105.8	149.8
1995	N/A[f]	22.6%	332.9	55.7	75.3
1996	N/A[f]	13.9%	474.0	50.7	65.7
1997	N/A[f]	17.2%	694.4	117.0	119.5
1998	N/A[f]	34.6%	729.7	234.8	252.2
1999	N/A[f]	38.3%	502.6	195.9	192.3
2000	N/A[g]	16.9%	197.1	28.6	33.3
2001	14.7%	13.8%	182.8	27.3	25.3
2002	10.2%	10.6%	308.6	31.0	32.7
2003	11.5%	12.7%	224.9	25.8	28.5
2004	11.4%	13.1%	183.2	20.8	23.9
2005	12.0%	14.1%	176.4	20.9	24.8

[a] Harvest strategy in effect since 2001 targets a percentage of the preseason survey estimate of mature male biomass.
[b] Actual harvest as a percentage of the preseason survey estimate of mature male biomass.
[c] Preseason estimate of mature male biomass provided by NMFS (millions of pounds).
[d] GHL established preseason (millions of pounds).
[e] Actual harvest (millions of pounds).
[f] GHL established as 58% percentage of males >101-mm carapace width.
[g] GHL established as 22% percentage of males >101-mm carapace width.

Table 5. Bristol Bay red king crab fishery harvest relative to harvest strategy target and guideline harvest level (GHL), 1993-2004.

Fishery Year	Harvest Strategy Target[a]	Actual[b]	Number of males >119 mm CL[c]	Number Harvested[d]	GHL[e]	Harvest[f]
1993	20%	23.0%	9.85	2.26	16.8	14.6
1994	Fishery Closed		8.49	0.00	0	0
1995	Fishery Closed		9.37	0.00	0	0
1996	10%	12.1%	10.34	1.25	5.0	8.4
1997	10%	11.2%	11.78	1.32	7.0	8.8
1998	15%	14.3%	15.00	2.14	16.3	14.8
1999	10%	11.5%	15.74	1.81	10.7	11.7
2000	10%	8.9%	13.13	1.17	8.4	8.2
2001	10%	9.8%	12.15	1.20	7.2	8.4
2002	10%	9.8%	14.11	1.38	9.3	9.6
2003	15%	14.3%	16.37	2.34	15.7	15.7
2004	15%	14.0%	15.97	2.24	15.4	15.3

[a] Harvest strategy targets 20% of abundance of males >119-mm carapace length (CL) as estimated from preseason survey.
[b] Actual number of legal males harvested as percentage of preseason estimated abundance of males >119-mm carapace length (CL).
[c] Estimated abundance of males >119-mm carapace length (CL) from preseason survey (millions of animals). From Vining and Zheng (2004).
[d] Millions of animals.
[e] GHL established preseason (millions of pounds).
[f] Actual harvest (millions of pounds).

Table 6. Pribilof king crab fishery harvest relative to guideline harvest level (GHL), 1993-2004.

		Harvest[a]		
Fishery Year	GHL[a]	Red King	Blue King	Total
1993	3.4[b]	2.61	0.00	2.61
1994	2[b]	1.34	0.00	1.34
1995	2.5[c]	0.87	1.27	2.14
1996	1.8[c]	0.20	0.94	1.14
1997	1.5[c]	0.76	0.51	1.27
1998	1.25[c]	0.51	0.52	1.03
1999		Fishery closed		
2000		Fishery closed		
2001		Fishery closed		
2002		Fishery closed		
2003		Fishery closed		
2004		Fishery closed		

[a] Millions of pounds.
[b] GHL established only for red king crab; closed to blue king crab.
[c] GHL estbalished for combined red and blue king crab.

Table 7. St. Matthew blue king crab fishery harvest relative to harvest strategy target and guideline harvest level (GHL), 1993-2004.

Fishery Year	Harvest Strategy Target[a]	Actual[b]	Number of males >104 mm CL[c]	Number Harvested[d]	GHL[e]	Harvest[f]
1993	20%	16%	3.98	0.63	4.4	3.00
1994	20%	20%	4.11	0.83	3.0	3.76
1995	20%	17%	3.99	0.67	2.4	3.17
1996	20%	15%	4.38	0.66	4.3	3.08
1997	20%	20%	4.70	0.94	5.0	4.65
1998	20%	15%	4.13	0.63	4.0	2.87
1999	Fishery closed		1.01	0	0	0
2000	Fishery closed		1.21	0	0	0
2001	Fishery closed		1.34	0	0	0
2002	Fishery closed		1.47	0	0	0
2003	Fishery closed		1.33	0	0	0
2004	Fishery closed		1.29	0	0	0

[a] Harvest strategy in effect for 1993-1998 seasons targeted 20% of abundance of males >104-mm carapace length (CL) as estimated from preseason survey.
[b] Actual number of legal males harvested as percentage of preseason estimated abundance of males >104-mm carapace length (CL).
[c] Estimated abundance of males >104-mm carapace length (CL) from preseason survey (millions of animals). From Vining and Zheng (2004).
[d] Millions of animals.
[e] GHL established preseason (millions of pounds).
[f] Actual harvest (millions of pounds).

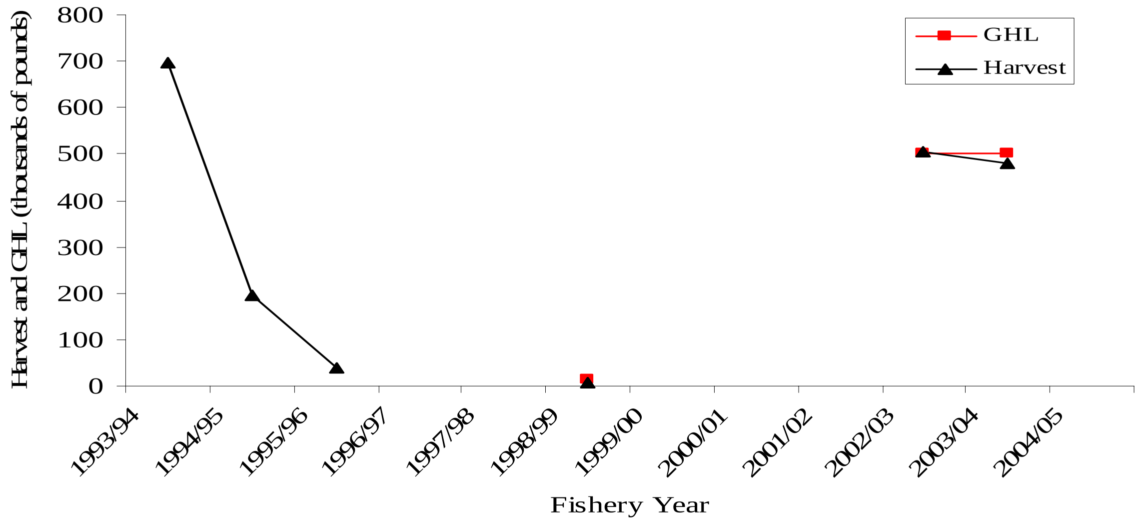

Figure 1. Western Aleutian Islands commercial red king crab fishery harvest and guideline harvest levels (GHLs), 1993/94-2004/05.

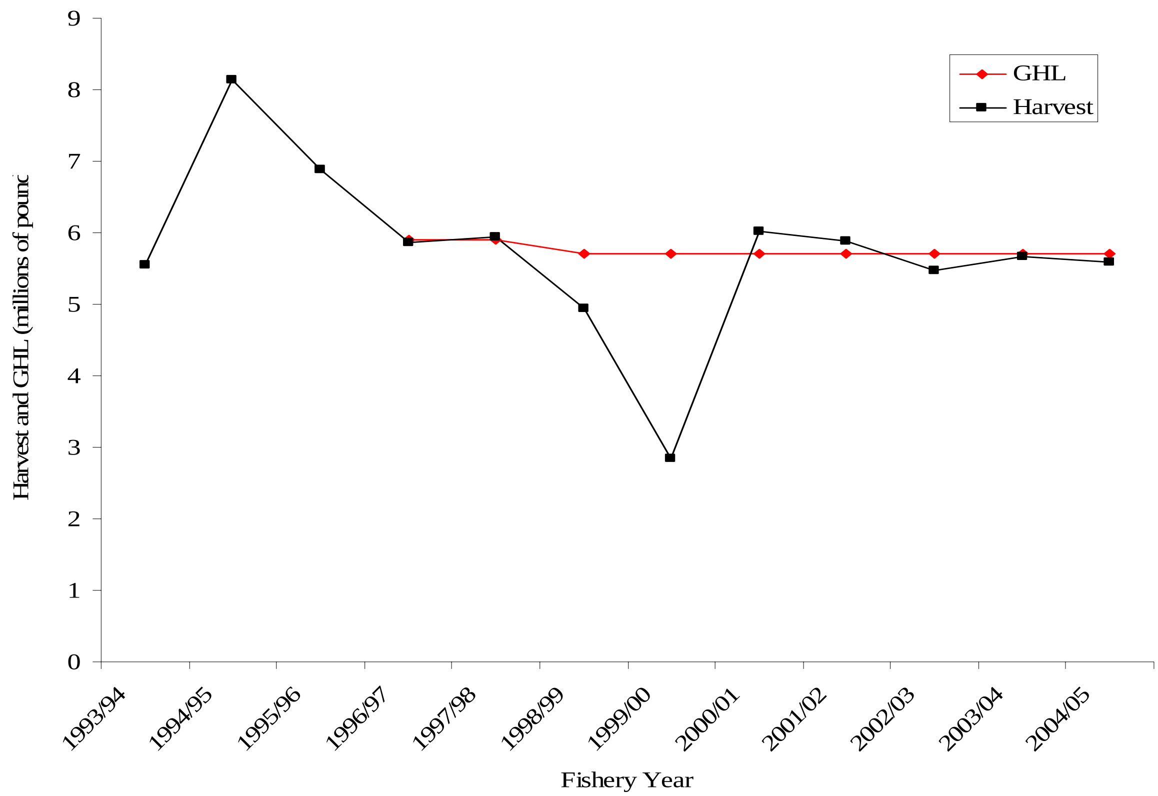

Figure 2. Aleutian Islands commercial golden king crab fishery harvest and guideline harvest levels (GHLs), 1993/94-2004/05

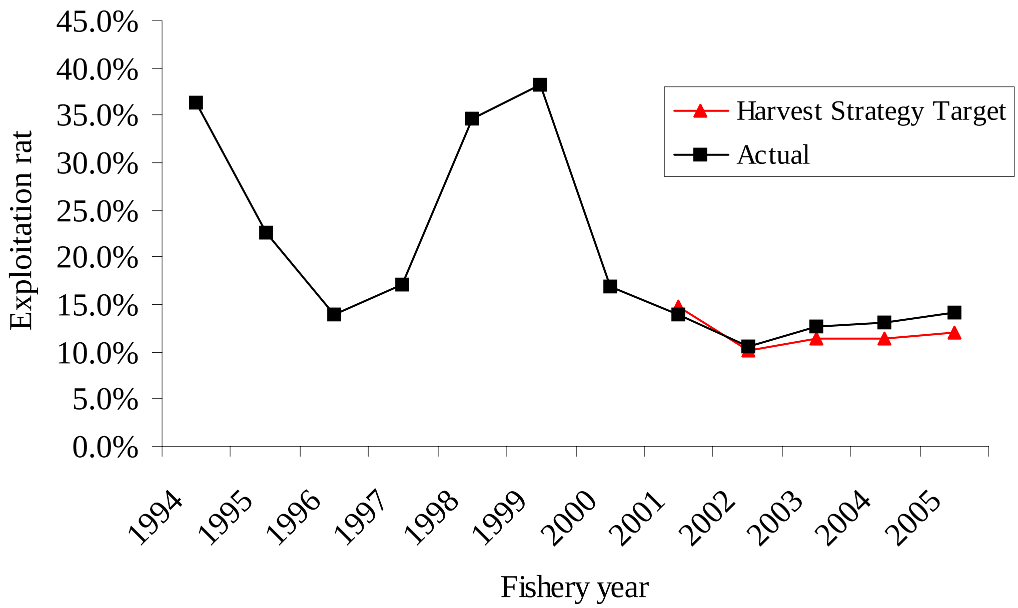

Figure 3. Comparison of harvest strategy specified and actual exploitation rates on mature male biomass in the Bering Sea commercial snow crab fishery, 1994-2005.

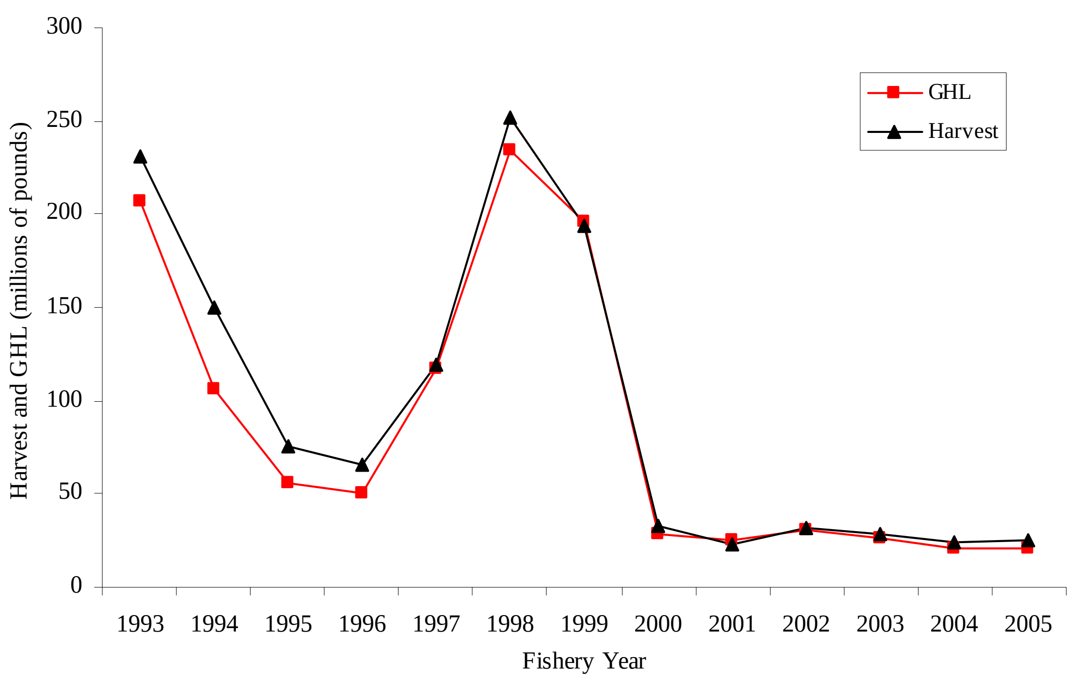

Figure 4. Bering Sea commercial snow crab general and CDQ fishery harvest and guideline harvest levels (GHLs), 1994-2005.

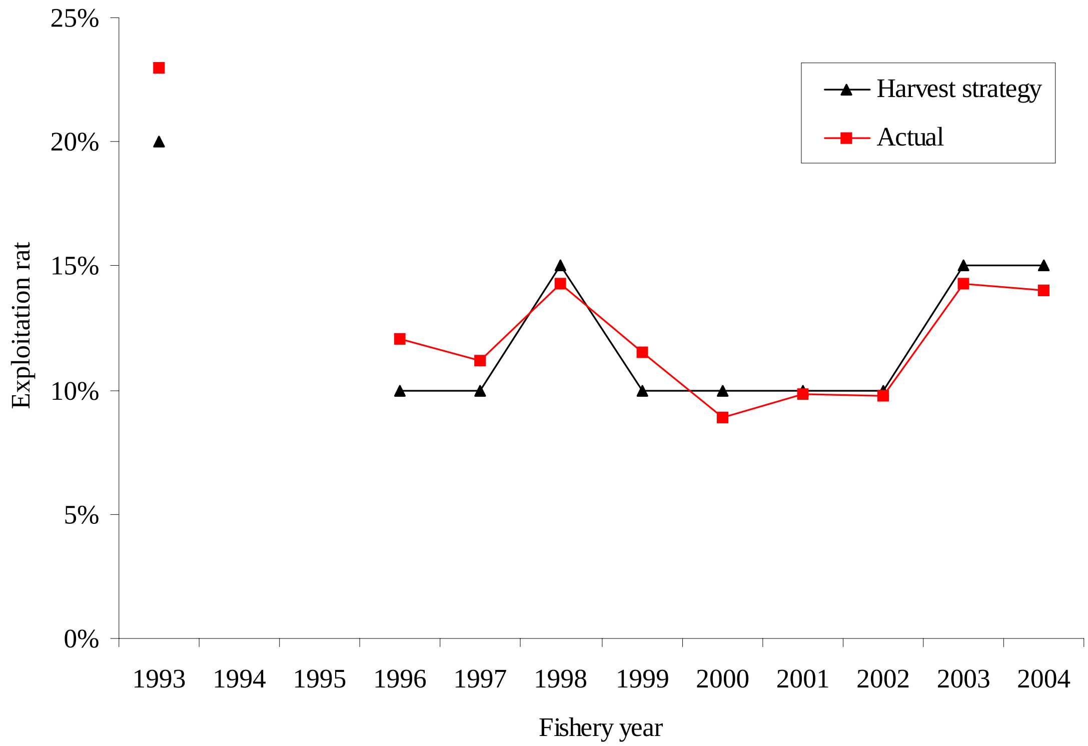

Figure 5. Comparison of harvest strategy specified and actual exploitation rates on males > 119-mm carapace length in the Bristol Bay red king crab commercial fishery, 1993-2004.

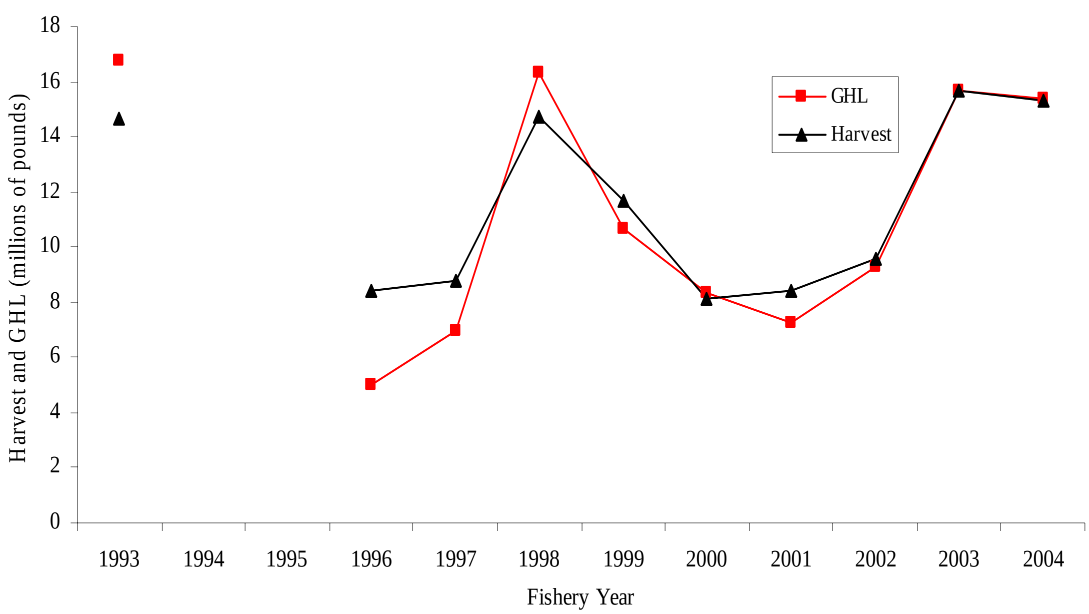

Figure 6. Bristol Bay commercial red king crab general and CDQ fishery harvest and guideline harvest levels, 1993-2004.

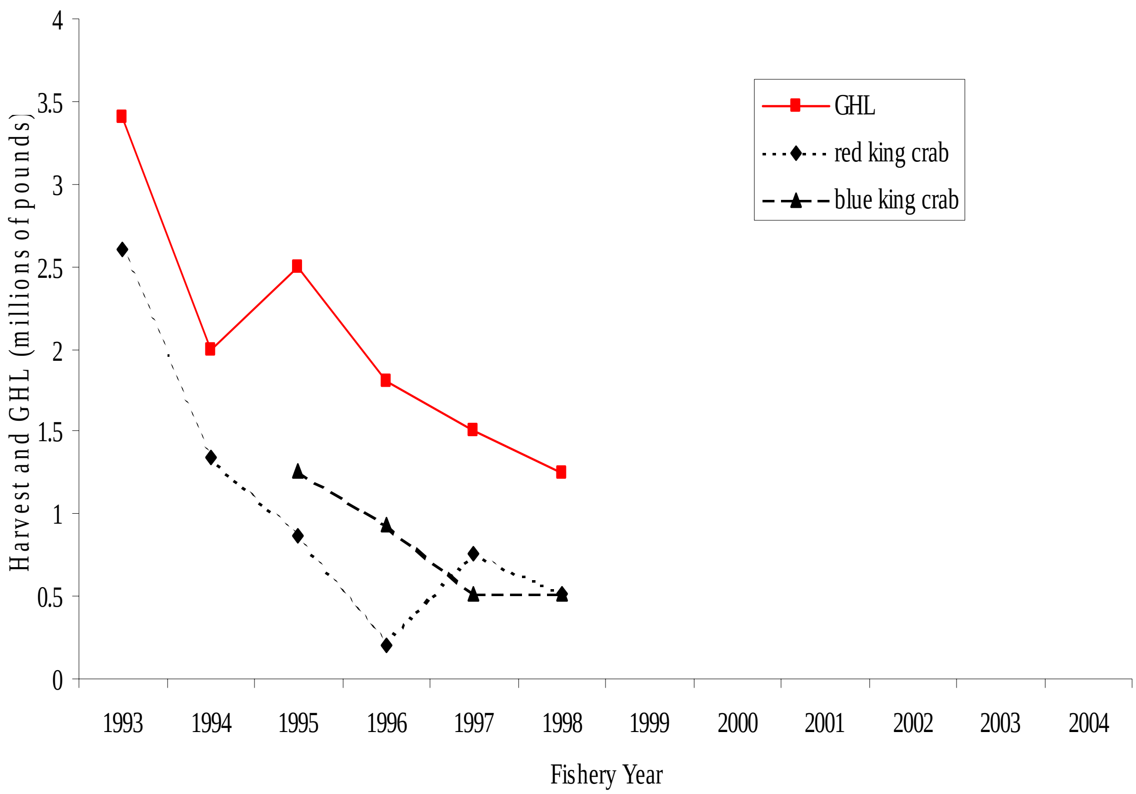

Figure 7. Pribilof District commercial red and blue king crab harvest and guideline harvest levels (GHLs), 1993-2004.

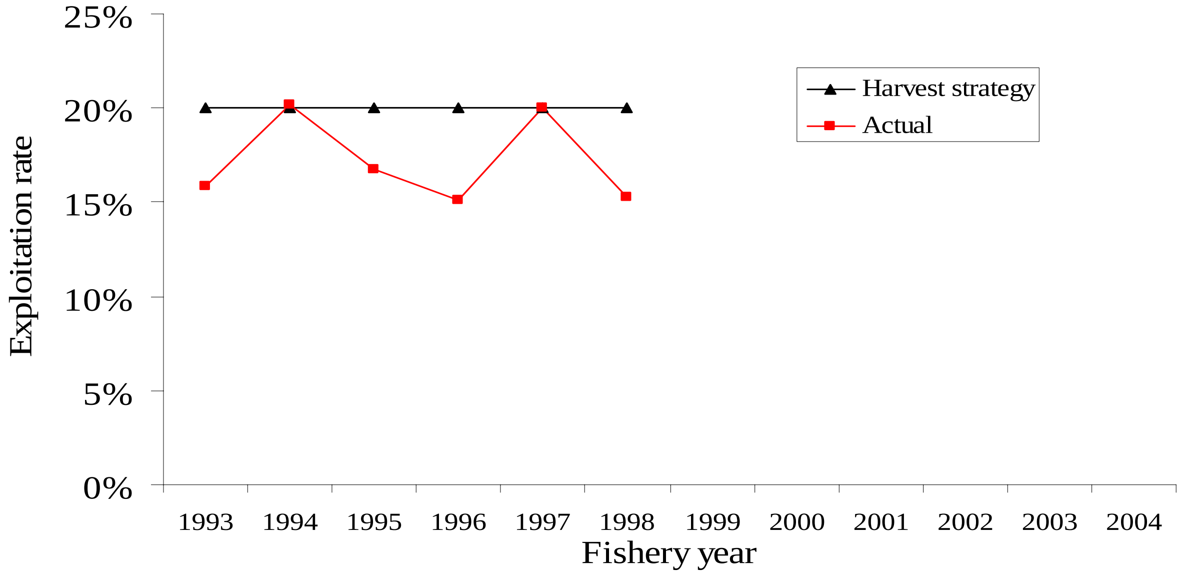

Figure 8. Comparison of harvest strategy specified and actual exploitation rates on mature-sized males (>104-mm carapace length) in the Saint Matthew Island Section commercial blue king crab fishery, 1993-2004.

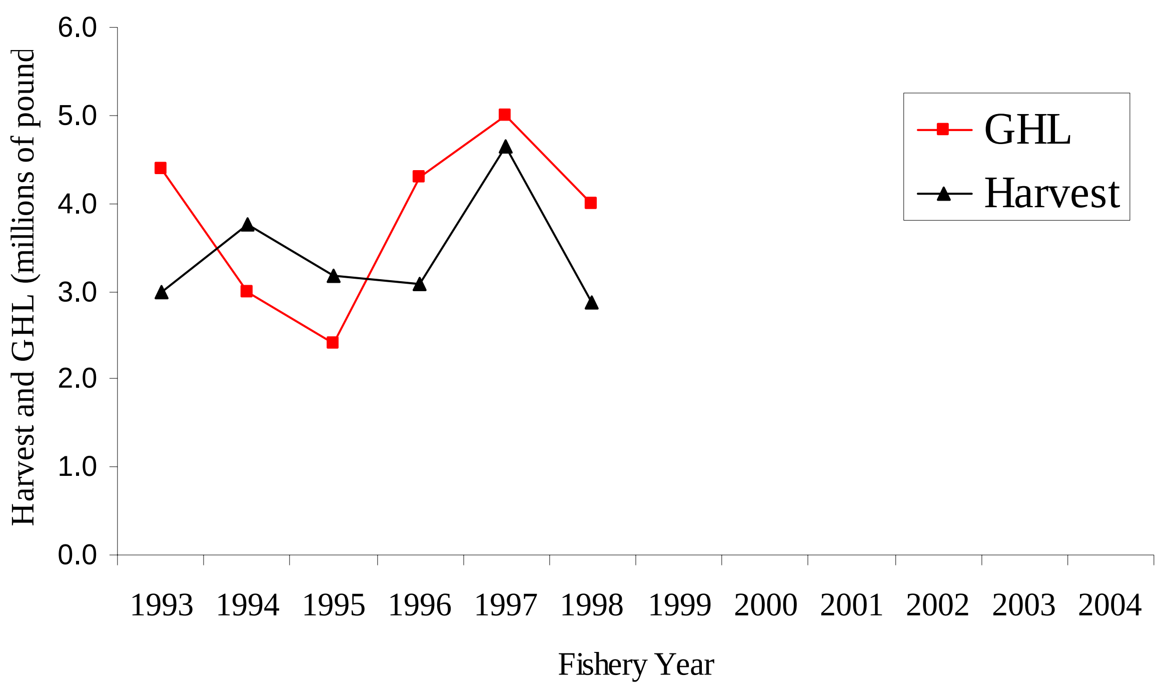

Figure 9. Saint Matthew Island Section commercial blue king crab harvest and guideline harvest levels (GHL), 1993-2004.

BSAI Crab Bycatch

David Witherell, Diana Stram, and Doug Pengilly

What is bycatch?

Bycatch of crab occurs in the directed crab pot fisheries and other fisheries, including groundfish and scallop fisheries. In the crab fisheries, crab bycatch includes females of target species, sublegal males of target species, and non-target crab. In all other fisheries, crabs are a prohibited species, so every crab caught incidentally is considered bycatch.

How many crabs are taken as bycatch?

The following tables show the numbers of crab taken as bycatch in these fisheries.

Bycatch of *C. opilio* crabs (numbers of crab) in Bering Sea fisheries, 1995-2004.

Year	directed crab pot	groundfish trawl	groundfish fixed gear	scallop dredge	Total
1995	48,734,000	5,165,555	230,233	0	54,129,788
1996	56,570,785	3,643,612	267,395	104,836	60,586,628
1997	75,005,446	5,276,208	554,103	195,345	81,031,102
1998	51,591,453	4,122,648	549,139	232,911	56,496,151
1999	47,093,200	1,544,747	269,778	150,421	49,058,146
2000	5,020,800	2,207,279	270,000	105,602	7,603,681
2001	6,123,100	1,293,143	215,000	68,458	7,699,701
2002	15,823,300	882,967	n/a	70,795	n/a
2003	22,140,336	615,012	86,313	16,206	22,857,867
2004	4,800,043	1,693,101	140,428	3,843	6,637,415

Bycatch of St. Matthew blue king crabs (numbers of crab) in Bering Sea fisheries, 1995-2004.

Year	directed crab pot	groundfish trawl	groundfish fixed gear	scallop dredge	Total
1995	confidential	2,725	47	0	n/a
1996	1,699,333	168	574	0	1,700,075
1997	confidential	8	187	0	n/a
1998	confidential	0	774	0	n/a
1999	n/a	0	4,983	0	n/a
2000	54,300	0	n/a	0	n/a
2001	1,300	0	n/a	0	n/a
2002	600	n/a	n/a	0	n/a
2003	0	855	1,263	0	2,118
2004	0	1,416	475	0	1,891

Bycatch of Bristol Bay red king crabs (numbers of crab) in Bering Sea fisheries, 1995-2004.

Year	directed crab pot	groundfish trawl	groundfish fixed gear	scallop dredge	Total
1995	0	44,934	3,257	0	48,191
1996	605,000	30,967	75,675	0	711,642
1997	985,000	50,711	25,579	0	1,061,290
1998	4,593,800	42,003	7,017	146	4,642,966
1999	957,800	84,709	8,968	1	1,026,178
2000	1,701,000	70,787	39,754	2	1,653,542
2001	2,419,100	58,552	19,000	0	2,496,652
2002	1,677,800	89,955	27,477	2	1,795,234
2003	5,808,200	91,937	13,531	0	5,913,668
2004	2,470,868	78,742	15,014	0	5,035,492

Bycatch of *C. bairdi* crabs (numbers of crab) in Bering Sea fisheries, 1995-2004.

Year	directed crab pot	groundfish trawl	groundfish fixed gear	scallop dredge	Total
1995	15,897,300	2,212,181	87,674	0	18,197,155
1996	4,588,000	1,836,031	279,560	17,000	6,930,591
1997	4,865,900	1,917,736	50,218	28,000	6,861,854
1998	4,293,800	1,477,816	46,552	36,000	5,854,168
1999	1,995,100	901,619	43,220	n/a	n/a
2000	491,000	1,002,074	140,453	53,614	1,539,141
2001	626,400	950,331	80,000	48,718	1,705,449
2002	1,282,600	1,086,286	98,848	48,053	2,515,787
2003	626,000	897,340	105,094	31,316	1,659,750
2004	334,593	800,794	38,592	15,303	2,849,032

Do all these crabs die?

Crab Fisheries

Some crabs taken as bycatch die due to handling mortality. Several laboratory and field studies have been conducted to determine mortality caused by handling juvenile and female crab taken in crab fisheries. There are a variety of effects caused by handling, ranging from sublethal (reduced growth rates, molting probabilities, decreased visual acuity from bright lights, and vigor) to lethal effects. Studies have shown a range of mortality due to handling based on gear type, species, molting stage, number of times handled, temperature, and exposure time (Murphy and Kruse 1995). Handling mortality may have contributed to what has been attributed to high natural mortality levels observed for Bristol Bay red king crab in the early 1980's (65% for males and 82% for females), that along with high harvest rates, may have resulted in stock collapse (Zheng et al. 1995). However, another study concluded that handling mortality from deck impacts and temperature was not responsible for the decline on the red king crab fishery (Zhou and Shirley 1995, 1996).

Byersdorfer and Watson (1992, 1993) examined red king crab and Tanner crab taken as bycatch during the 1991 and 1992 red king crab test fisheries. Instantaneous handling mortality of red king crab was <1% in 1991, and 11.2% in 1992. Stevens and MacIntosh (1993) found average overall mortality of 5.2% for red king crabs and 11% for Tanner crabs on one commercial crab vessel. Authors recommend these results be viewed with caution, noting that experimental conditions were conservative; mortality in the fishery might be higher. Mortality for red king crab held 48 hours was 8% (Stevens and MacIntosh 1993, as cited in Queirolo et al. 1995). A laboratory study that examined the effects of multiple handling indicated that mortality of discarded red king crabs was negligible (2%), although body damage increased with handling (Zhou and Shirley 1995).

Delayed mortality due to handling does not appear to be influenced by method of release. In an experiment during a test fishery, red king crab thrown off the deck while the vessel was moving versus those gently placed back into the ocean had no differences in tag return rates (Watson and Pengilly 1994). Handling methods on mortality have been shown to be non-significant in laboratory experiments with red king crab (Zhou and Shirley 1995, 1996) and Tanner crab (MacIntosh et al. 1996). Although handling did not cause mortality, injury rates were directly related to the number of times handled.

Mortality of crabs is also related to time out of water and air temperature. A study of red king crabs and Tanner crabs found that crabs exposed to air exhibited reduced vigor and righting times, feeding rates (Tanner crabs), and growth (red king crabs) (Carls and O'Clair 1989). For surviving females, there was no impact on survival of eggs or larvae. Cold air resulted in leg loss or immediate mortality for Tanner crabs, whereas red king crabs exhibited delayed mortality that occurred during molting. A relationship was developed to predict mortality as the product of temperature and duration of exposure (measured as degree hours). Median lethal exposure was -8oC for red king crab and -4.3oC for Tanner crab. For example, if crabs were held on deck for 10 minutes and it was -23oC (10 degrees below zero Fahrenheit) outside, about 15% of the king crab and 50% of the Tanner crab would die of exposure. Because BSAI crab fisheries occur from November through March, cold exposure could cause significant handling mortality to crabs not immediately returned to the ocean. Zhou and Shirley (1995) observed that average time on deck was generally 2 to 3 minutes, and they concluded that handling mortality was not a significant source of mortality for red king crab.

Further research has indicated that windchill may be an important mortality factor. In 1997, a laboratory study examined the effects of cold windchill temperature on mortality, limb loss, and activity (righting response) for sublegal sized male Tanner crabs (Zhou and Kruse, 1998, Shirley 1998). The study found significant inverse relationships between windchill and crab mortality, limb loss, and activity. Crabs were exposed to combinations of temperatures and wind speeds for duration of 5 minutes, then placed in seawater tanks and held for 7 days. Zhou and Kruse (1998) found that virtually all crabs died when exposed to windspeeds greater than 7.7 m/s (15 nautical miles per hour) and air temperatures less than -10.4ºC (13.3oF). Stronger winds, even at warmer temperatures (but still below freezing), can have the same effect. Shirley (1998) reported that 50% of the Tanner crabs died in windchill temperatures of -11ºC (this windchill temperature can result from air temperatures of 21ºF and wind speeds of 30 nautical miles per hour). He concluded that “The effects of windchill on sublegal Tanner crabs is dramatic, and undoubtedly results in decreased recruitment to adult stocks”.

Laboratory experiments found that snow crabs were more sensitive than either Tanner crabs (Shirley 1998) or red king crabs (Shirley 1999) and experienced 100% to 40% mortality within 7 days after exposure to windchill values from -16ºC to -10ºC (Warrenchuk and Shirley, 2002a). Snow crab males were exposed to wind speeds from 8 to 16 m/s and air temperatures from -2 to -10ºC for 5 minutes (corresponding to 16 to 32 mph and 28 to 14ºF, respectively). Reducing exposure time to 2.5 minutes significantly reduced mortality. Limb loss was variable, but pronounced at windchill values below -10ºC. Coordination of crabs (measured as an ability to right themselves) was impaired after all but the least severe treatment; concern for the crabs ability to avoid predation after exposure is warranted (Warrenchuk 2001; Warrenchuk and Shirley, 2002a). Warrenchuk and Shirley (2002b) applied the results from their laboratory study on the effects of windchill on snow crab mortality (Warrenchuk and Shirley 2002a) to estimate the mortality of snow crabs that were discarded during the 1998 EBS snow crab fishery. Mortality of non-retained snow crab during the 1998 fishery was estimated to be from 3.6% (windchill model) to 19.6% (temperature/windspeed model) (Warrenchuk and Shirley 2002b).

Although cold temperatures and windchill clearly have been shown to effect mortality, limb loss, and impaired righting response in snow and Tanner crabs, it remains uncertain how well experimental conditions used to estimate effects of wind chill reflect the exposure to discarded crabs during actual fishing conditions. For example, features of fishing vessels and fishing practices (e.g., shelter decks, storm walls, use of totes, and leeward alignment of vessels during gear retrieval) may provide some protection to captured and sorted crabs from windchill exposure. Additionally, observer data collected during the 1998 and 1999 snow crab seasons indicate that sorted bycatch typically is returned to the sea in less time than the 5 minutes that crabs were exposed to windchill during the laboratory study (Tracy and Byersdorfer 2000, Byersdorfer and Barnard 2002). Observers randomly chose pots fished during the 1998 general fishery, the 1998 CDQ season, the 1999 general fishery, and the 1999 CDQ fishery and recorded the maximum exposure time (i.e., the time from when a pot was lifted from the water until when the last non-retained crab in the pot was returned to the sea) from each pot. The means of the maximum exposure times were: 4.4 minutes for 1998 general fishery (n=1,548 pots; Tracy and Byersdorfer 2000), 6.1 minutes for the 1998 CDQ fishery (n=1,104 pots; Tracy and Byersdorfer 2000), 3.7 minutes for the 1999 general fishery (n=677 pots; Byersdorfer and Barnard 2002), and 5.1 minutes for the 1999 CDQ fishery (n=406 pots; Byersdorfer and Barnard 2002). Byersdorfer and Barnard (2002) noted that the mean maximum exposure times were influenced by outlying values and that the median of the maximum exposure times for the 1999 general fishery was 2.9 minutes and for the 1999 CDQ fishery was 3.8 minutes. It is also notable that deadloss during historic snow crab fisheries has been low, ranging from 0.7% to 2.0% of the total annually delivered crabs during the 1990 through 1998 seasons. Snow crabs delivered to processors during the 1990-1998 seasons were typically held in vessel holding tanks for one to three weeks prior to delivery (R. Morrison, ADF&G-retired, *pers. comm*.); i.e., for as long as or longer than the time that mortality due to windchill was exhibited in the laboratory studies on snow crabs (Warrenchuck and Shirley 2002a) and Tanner crabs (Shirley 1998). The applicability of deadloss rates to mortality rates in discarded crabs due to windchill exposure may be questionable, however, due to differences in exposure times between retained and non-retained crabs. Data collected from fishing vessels during the 1998 and 1999 seasons indicate that crew on 50-60% of vessels prioritize retrieving retainable crabs from pots before removing and discarding bycatch crabs Tracy and Byersdorfer 2000, Byersdorfer and Barnard 2002); on the remainder vessels release of bycatch crabs was either prioritized or there was no clear priority for either bycatch or retained crabs. Also, non-retained crabs are smaller and may lose heat quicker than retained crabs. Smaller crabs have a greater surface area to volume ratio and less thermal mass (Shirley 1999). Smaller juvenile Tanner crabs were more sensitive to cold aerial exposure than larger adults (Carls and O'Clair 1995) and adult Tanner crabs were more sensitive to exposure and windchill than larger red king crabs (Carls and O'Clair 1990; Shirley 1999).

In summary, the actual rates of mortality to captured crabs discarded during crab fisheries remains unknown. Deadloss rates in deliveries cannot be considered applicable because of differences between the treatment of retained and non-retained crabs. Retained crabs are dropped only a short distance directly into the holding tanks, while non-retained crabs may be thrown over the side of the vessel or swept along the deck into scuppers, which results in rougher and more prolonged handling. Additionally, mortality due to capture and discarding may not be exhibited under the conditions of a holding tank or within the time that crabs are held in tanks prior to delivery. The Crab Plan Team has estimated bycatch mortality to be higher in the snow and Tanner crab fisheries (24% and 20%, respectively) than in the king crab fisheries (8%) and that has been supported by higher incidence of pre-discard injuries during the snow crab fishery than in the red king crab fishery (Tracy and Byersdorfer 2000, Byersdorfer and Barnard 2002). Warrenchuck and Shirley (2002) estimated the bycatch mortality rate for crabs discarded during the 1998 EBS snow crab fishery to be 22.2%, which they considered to be in agreement with the rate of 25% assumed in analyses for the EBS snow crab rebuilding plan (NPFMC 2000). Given the uncertainty in true bycatch mortality rates and the sensitivity of conservation considerations to bycatch mortality rates, the Crab Plan Team's Working Group on overfishing definitions is currently (September 2005) assuming bycatch mortality rates of 20% for the red king crab fishery and 50% for the snow crab fishery.

Trawl Fisheries

The effect of crab bycatch on crab stocks is somewhat tempered by survival of discarded crabs. There have been numerous studies conducted on crab bycatch mortality, with each study having different objectives, methodology, and results. A summary of these studies is provided below, but many questions remain unanswered. Stevens (1990) found that 21% of the king crabs and 22% of the Tanner crabs captured incidentally in BSAI trawl fisheries survived at least 2 days following capture. Blackburn and Schmidt (1988) made observations on instantaneous mortality of crab taken by domestic trawl fisheries in the Kodiak area. They found acute mortality for softshell red king crab averaged 21%, hard shelled red king crab 1.2%, and 12.6% for Tanner crab. Another trawl study indicated that trawl induced mortalities aboard ship were 12% for Tanner crab and 19% for red king crab (Owen 1988). Fukuhara and Worlund (1973) observed an overall Tanner crab mortality of 60-70% in the foreign Bering Sea trawl fisheries. They also noted that mortality was higher in the summer (95%) than in the spring (50%). Hayes (1973) found that mortality of Tanner crab captured by trawl gear was due to time out of water, with 50% mortality after 12 hours. Natural Resource Consultants (1988) reported that overall survival of red king crab and Tanner crab bycaught and held in circulation tanks for 24-48 hours was <22%. In other analyses, the estimated mortality rate of trawl bycaught red king crab and Tanner crab was 80% (NPFMC 1993, 1995).

Other Groundfish Fisheries

Some crabs are caught incidentally by non-trawl gear in pursuit of groundfish, and a portion of these crabs die. No field or laboratory studies have been made to estimate mortality of crab discarded in these fisheries. However, based on condition factor information from the trawl survey, mortality of crab bycatch has been estimated and used in previous analyses (NPFMC 1993). Discard mortality rates for red king crab were estimated at 37% in longline fisheries and 37% in pot fisheries. Estimated bycatch mortality rates for Tanner crab were 45% in longline fisheries and 30% in pot fisheries. No observations had been made for snow crab, but mortality rates are likely similar to Tanner crab. In the analysis made for Amendment 37, a 37% mortality rate was assumed for red king crab taken in longline fisheries and an 8% rate for pot fisheries. Observer data on condition factors collected for crab during the 1991 domestic fisheries suggested lower mortality of red king crab taken in groundfish pot fisheries. Bycatch mortality rates used in the analysis of Amendment 37 (NPFMC 1996) for snow crabs were 45% in longline fisheries and 30% in pot fisheries.

Scallop Fishery

Observations from scallop fisheries across the state suggest that mortality of crab bycatch is low relative to trawl gear due to shorter tow times, shorter exposure times, and lower catch weight and volume. For crab taken as bycatch in the Gulf of Alaska weathervane scallop fishery, Hennick (1973) estimated that about 30% of Tanner crabs and 42% of the red king crabs bycaught in scallop dredges were killed or injured. Hammerstrom and Merrit (1985) estimated mortality of Tanner crab at 8% in Cook Inlet. Kaiser (1986) estimated mortality rates of 19% for Tanner crab and 48% for red king crab bycaught off Kodiak Island. Urban el al. (1994) reported that in 1992, 13-35% of the Tanner crab bycaught were dead or moribund before being discarded, with the highest mortality rate occurring on small (<40 mm cw) and large (>120 mm cw) crabs. Delayed mortality resulting from injury or stress was not estimated. Mortality in the Bering Sea appears to be lower than in the Gulf of Alaska, in part due to different sizes of crab taken. Observations from the 1993 Bering Sea scallop fishery indicated lower bycatch mortality of red king crab (10%), Tanner crab (11%) and snow crab (19%). As with observations from the Gulf of Alaska, mortality appeared to be related to size, with larger and smaller crabs having higher mortality rates on average than mid-sized crabs (D. Pengilly, ADF&G, unpublished data). Immediate mortality of Tanner crabs from the 1996 Bering Sea scallop fishery was 12.6% (Barnhart and Sagalkin 1998). Delayed mortality was not estimated. In the analysis made for Amendment 41, a 40% discard mortality rate (immediate and delayed mortality combined) was assumed for all crab species.

So what are the population impacts of bycatch?

By applying mortality rates estimated from scientific observations to the number of crabs taken as bycatch, it is possible to estimate the relative impacts of bycatch on crab populations. Discard mortality rates have been established in previous analysis (NPFMC 1999), and may be species or fishery specific. Bycatch mortality rates in trawl, dredge, and fixed gear fisheries for all crab species were set at 80% , 40%, and 20% respectively. For crab fisheries, mortality rates were averaged across different fisheries. Rates used were 24% for *C. opilio*, 20% for *C. bairdi*, and 8% for blue king crab and red king crab.The following tables show the resulting discard mortality estimates, the estimated population size based on the NMFS trawl survey, and the percentage of the population removed due to bycatch mortality.

Total bycatch (numbers) mortality of red king crab in all fisheries in the Bristol Bay area, 1995-2004, and current years survey abundance estimate.

Year	Total Bycatch	Bycatch mortality	Abundance (millions)	Bycatch as %
1995	48,191	35,599	33.9	0.11
1996	711,642	88,309	53.3	0.17
1997	1,061,290	124,485	75.1	0.17
1998	4,642,966	402,568	75.6	0.52
1999	1,026,178	144,161	46.7	0.22
2000	1,653,542	200,661	50.0	0.40
2001	2,496,652	244,169	44.2	0.55
2002	1,795,234	206,188	78.3	0.26
2003	5,913,668	538,205	84.1	0.64
2004	5,035,492	263,666	104.8	0.25

Total bycatch (numbers) mortality of blue king crab in all fisheries in the St. Matthew area, 1995-2004, and current years survey abundance estimate.

Year	Total Bycatch	Bycatch mortality	Abundance (millions)	Bycatch as %
1995	n/a	conf	5.6	*
1996	1,700,075	136,196	10.0	1.36
1997	n/a	conf	10.0	*
1998	n/a	conf	8.4	*
1999	n/a	997	1.7	0.06
2000	n/a	n/a	1.7	*
2001	n/a	n/a	2.9	*
2002	n/a	48	1.2	0.001
2003	2,118	0	3.3	0
2004	1,891	1,228	2.7	0.045

Total bycatch mortality (numbers) of *C. bairdi* crab in all fisheries in the Bering Sea, 1995-2004, and current years survey abundance estimate.

Year	Total Bycatch	Bycatch mortality	Abundance (millions)	Bycatch as %
1995	18,197,155	4,966,740	189.9	2.62
1996	6,930,591	2,449,137	175.6	1.39
1999	6,861,854	2,528,612	159.0	1.59
1998	5,854,168	2,064,723	156.5	1.32
1999	n/a	n/a	349.5	*
2000	1,539,141	949,394	219.2	0.43
2001	1,705,449	921,032	600.1	0.15
2002	2,515,787	1,125,549	437.6	0.26
2003	1,659,750	843,072	448.1	0.19
2004	2,849,032	731,035	571.7	0.13

Total bycatch mortality (numbers) of *C. opilio* in all fisheries in the Bering Sea, 1995-2004, and current years survey abundance estimate.

Year	Total Bycatch	Bycatch mortality	Abundance (millions)	Bycatch as %
1995	54,129,788	15,874,651	8,655.3	0.18
1996	60,586,628	16,587,291	5,424.9	0.31
1997	81,031,102	22,411,232	4,107.5	0.55
1998	56,496,151	15,883,059	3,233.3	0.49
1999	49,058,146	11,349,869	1,401.0	0.81
2000	7,603,681	3,067,056	3,241.2	0.09
2001	7,699,701	2,589,299	3,861.3	0.07
2002	n/a	4,503,965	1,517.7	0.30
2003	22,857,867	5,805,709	2,630.8	0.22
2004	6,637,415	2,531,803	4,420.7	0.06

What about unobserved mortality?

In addition to those crabs that are captured as bycatch, fishing activities can also cause crab mortality in ways that cannot be directly observed. A summary of these potential unobserved mortalities are discussed below.

Crab Fishery

Catching mortality is ascribed to those crabs that enter a pot and are eaten by other pot inhabitants before the pot is retrieved. Catching mortality likely occurs during the molting period, when crabs are more susceptible to cannibalism. Most crab fisheries are set to occur outside of the molting season, and catching mortality in these fisheries may be limited to octopus or large fish entering a pot. Because no evidence of crab is left in the pot, these mortalities remain unassessed.

Mortality is also caused by ghost fishing of lost crab pots and groundfish pots. Ghost fishing is the term used to describe continued fishing by lost or derelict gear. The impact of ghost fishing on crab stocks remains unknown. It has been estimated that 10% to 20% of crab pots are lost each year (Meyer 1971, Kruse and Kimker 1993). Based on skipper interviews, about 10,000 pots were estimated lost in the 1992 Bristol Bay red king, and Bering Sea Tanner and snow crab fisheries (Tracy 1994). Fewer pots are expected to be lost under pot limit regulations and shorter seasons. Bob Schofield, a major crab pot manufacturer, testified at the January 1996 Council meeting that he was making fewer pots since inception of the pot limit. He estimated that 6,461 pots were replaced in 1995. It is not known how long lost pots may persist and continue to fish, or just litter the bottom.

A sonar survey of inner Chiniak Bay (Kodiak, Alaska) found a high density of lost crab pots (190 pots) in an area of about 4.5 km2 (Vining et al. 1997). Underwater observations indicated that crabs and fish were common residents of crab pots, whether or not the pot mesh was intact. Intact pots recovered from the Chiniak Bay study area often contained crabs (primarily Tanner crabs) and octopus. High (1985) and High and Worlund (1979) observed that 20% of legal sized male red king crab and 8% of the sublegals captured by lost pots failed to escape.

Crabs captured in lost pots may die of starvation or by predation. Captured crab are subject to cannibalism (Paul et al. 1993), and predation by octopus, halibut and Pacific cod (High 1976). Crabs may have limited abilities to withstand starvation. In a simulated field study, 39% mortality of Tanner crabs was observed after 119 days of starvation (Kimker 1994). In a laboratory study, 10% of the Tanner crabs tested died of starvation in 90 days. Of the 90% that had survived 90 days, all later died even though they were freely fed (Paul et al. 1993). However, highest survival rates for juvenile king crabs fed a variety of diets were from those treatments recieving no food, even for extended period of 3 to 4 months (Shirley, unpublished data). To reduce starvation mortality in lost pots, crab pots have been required to be fitted with degradable escape mechanisms. Regulations required #120 cotton thread from 1977-1993. Beginning in 1993, regulations required #30 cotton thread or 30-day galvanic timed release mechanisms. A #30 cotton thread section is also required in groundfish pots. The average time for #30 cotton twine to degrade is 89 days, and the galvanic timed release about 30 days to degrade. Pots fitted with an escape mechanism of #72 cotton twine had a fishable life of 3-8 years and documented retention of up to 100 crabs per lost pot (Meyer 1971). High and Wolund (1979) estimated an effective fishing life of 15 years for king crab pots. Pots without escape mechanisms could continue to catch and kill crabs for many years, however testimony from crabbers and pot manufacturers indicate that all pots currently fished in Bering Sea crab fisheries contain escape mechanisms.

Mortality of crab caused by ghost fishing is difficult to estimate with precision given existing information. Mortality caused by continuous fishing of lost pots has not been estimated, but unbaited crab pots continue to catch crabs (Breen 1987, Meyer 1971), and pots are subject to rebaiting due to capture of Pacific cod, halibut, sablefish, and flatfish. In addition to mortality of trapped crab by ghost pots, and predation by octopus and fish, pot mesh itself can kill crabs. Lost pots retrieved by NMFS trawl surveys occasionally contain dead crabs trapped in loose webbing (Brad Stevens, NMFS, pers. comm). Pot limits and escape mechanisms may have greatly minimized ghost fishing due to pot loss in recent years.

Another very minor source of human induced crab mortality is direct gear impacts. Direct gear impacts result from a pot landing on the ocean floor when it is being set, presumably damaging any crab on which it lands. With reasonable assumptions, direct gear impacts are only a very minor source of mortality, however. An estimate of this impact can be derived by multiplying the number of pot lifts, the area they occupy, and relative crab density within areas fished in the Bering Sea. Assuming that pots land on different areas after each lift, and crab pots are set non-randomly over areas with relatively high density of crabs in directed fisheries, the total number of crab impacted can be roughly estimated. For 1993 the red king crab fishery, assuming a density of 5,000 red king crab of all sizes per square mile (density data from Stevens et al. 1998), a maximum of about two thousand red king crab were impacted (NPFMC 1996). Similarly, a maximum of 9,000 Tanner crabs (assuming 10,000 crab/mile2) and 110 thousand snow crabs (assuming 75,000 crab/mile2) were impacted by direct gear impacts in respective crab fisheries in 1993. It is not known what proportion of these crab die when a crab pot lands on them.

Trawl Gear

Not all crabs in the path of a trawl are captured. Some crab pass under the gear, or pass through the trawl meshes. Non-retained crabs may be subject to mortality from contact with trawl doors, bridles, footrope, or trawl mesh, as well as exposure to silt clouds produced by trawl and dredge gear. Only a few studies have been conducted to estimate catchability of crabs by trawl gear, and these studies are summarized below.

In one experiment to measure non-observable mortality, 169 red king crabs were tethered in the path of an Aleutian combination trawl (Donaldson 1990). The trawl was equipped with a footrope constructed of 14 inch bobbins spaced every 3 feet, separated by 6.5 inch discs. Thirty-six crabs (21.3%) were recovered onboard the vessel in the trawl. Divers recovered 46.2% of the crabs not captured by the trawl. Another 32.5% were not recovered but assumed to have interacted with the trawl. Of the 78 crabs not retained in the trawl, but captured by divers, only 2.6% were injured. If all injured crabs die, the non-observable mortality rate for trawl gear on red king crabs is estimated at 2.6% (Donaldson 1990). It should be noted that hard shelled crabs were used in this experiment; higher impacts would be expected if softshelled crabs were tested. Additionally, some areas have had higher intensity of bottom trawling than other areas, thus potentially exposing some crabs to multiple interactions with trawl gear.

In 1995, NMFS used underwater video cameras to observe the interaction of trawl gear with king and Tanner crabs (Craig Rose, NMFS, unpublished data). The experiment was conducted in Bristol Bay in an area with large red king crabs and Tanner crabs. Three types of trawl footropes were examined and they are as follows: a footrope with 3-4 foot lengths of 6" discs separated by 10" discs (called disc gear), a footrope with 24" rollers (tire gear), and an experimental float/chain footrope with the groundgear suspended about 8" off the seafloor. For disc gear, preliminary analysis indicated that all red king crab encountered entered the trawl and about 76% of the Tanner crabs were caught. Tire gear captured fewer king crabs (42%) and Tanner crabs (1%). The float/chain gear did not catch any of the crabs encountered. At the December 1995 Council meeting, excerpts of the NMFS video were shown to the Council and public. Trawl industry representatives testified that groundgear used to harvest finfish in this area depended on target species and bottom type, with tire gear type footropes used in hard bottom areas, and disc type gear used on smooth bottom areas. Testimony also indicated that variability existed in groundgear used among vessels, but that on average, most gear used in Bristol Bay trawl fisheries would be comprised of groundgear with discs or rollers larger than the disc gear tested and smaller than the tire gear tested.

The NMFS underwater video observations were further analyzed to determine the proportion of red king crab that were injured by passage under bottom trawl footropes (Rose 1999). Injury rates of 5% to 10% were estimated for crabs that encountered, but were not captured, in the center section of the trawl.

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Fishery Management Report No. YY-XX

Annual Management Report for the Commercial and Subsistence Shellfish Fisheries of the Aleutian Islands, Bering Sea and the Westward Region's Shellfish Observer Program, 2004

by

Westward Region Shellfish Staff

xxxx 2005

Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Measures (fisheries)

fork length	FL
mideye-to-fork	MEF
mideye-to-tail-fork	METF
standard length	SL
total length	TL

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	log_2, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

FISHERY MANAGEMENT REPORT NO. YY-XX

ANNUAL MANAGEMENT REPORT FOR THE COMMERCIAL AND SUBSISTENCE SHELLFISH FISHERIES OF THE ALEUTIAN ISLANDS, BERING SEA AND THE WESTWARD REGION'S SHELLFISH OBSERVER PROGRAM, 2004

by

Westward Region Shellfish Staff

Alaska Department of Fish and Game
Division of Sport Fish, Research and Technical Services
333 Raspberry Road, Anchorage, Alaska, 99518-1599

xxxx 2005

The Division of Sport Fish Fishery Management Reports series was established in 1989 for the publication of an overview of Division of Sport Fish management activities and goals in a specific geographic area. Since 2004, the Division of Commercial Fisheries has also used the Fishery Management Report series. Fishery Management Reports are intended for fishery and other technical professionals, as well as lay persons. Fishery Management Reports are available through the Alaska State Library and on the Internet: http://www.sf.adfg.state.ak.us/statewide/divreports/html/intersearch.cfm. This publication has undergone regional peer review.

Alaska Department of Fish and Game
Division of Commercial Fisheries
211 Mission Road, Kodiak, Alaska 99615, USA

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ABSTRACT

The Alaska Department of Fish and Game (ADF&G) is tasked with management of all commercial, subsistence and personal use shellfish fisheries occurring in the Territorial Sea and Exclusive Economic Zone (EEZ) of the Aleutian Islands west of Scotch Cap Light (164° 44' W long.) and all Bering Sea waters of the Territorial Sea and EEZ north of Cape Sarichef (58° 39' N lat.). King crab in the Bering Sea north of Cape Romanzof and Tanner crab in Norton Sound are managed by ADF&G's Arctic-Yukon-Kuskokwim Region.

In 2004, three species of king crabs, snow crabs, Tanner crabs, Dungeness crabs, and giant Pacific octopus were taken in the Bering Sea and Aleutian Islands (BSAI) commercial and subsistence fisheries.

This report presents details on the commercial and subsistence harvest, participation and value of shellfish fisheries in the BSAI area. Historical and current fishery management practices, a summary of the most recent commercial fishery and stock status information are presented for each fishery. The Bering Sea king and Tanner crab Community Development Quota (CDQ) crab fisheries and American Fisheries Act (AFA) crab sideboards for Bristol Bay red king crab are summarized.

To enhance shellfish fishery management and collect data that would otherwise be unavailable, ADF&G has operated an observer program in the BSAI for crab since 1988 and for scallop since 1993. Varying levels of observer coverage are required for each crab fishery and observers are deployed on catcher vessels, catcher processors and floating processors. Observer costs are paid by either the vessel or ADF&G test fishery revenues. Details of the crab and scallop observer program are presented as well as information on the BSAI pot limit program.

Key words: Tanner crab, *Chionoecetes bairdi*, snow crab, *C. opilio*, C. tanneri, Dungeness crab, *Cancer magister*, golden king crab, *Lithodes aequispinus*, red sea cucumber, *Parastichopus californicus*, red king crab *Paralithodes camtschaticus*, Pacific octopus, Community Development Quota, CDQ, American Fisheries Act, AFA, subsistence, Bering Sea, Aleutian Islands, North Peninsula.

INTRODUCTION

The ADF&G Westward Region includes all waters of the Territorial Sea and EEZ south of Cape Douglas (58° 51.1' N lat.) and west of 148° 50.25' W long. to the U.S.-Russia Maritime Boundary. ADF&G in Dutch Harbor is tasked with management of all commercial, subsistence and personal use shellfish fisheries occurring in the Territorial Sea and Exclusive Economic Zone (EEZ) of the Aleutian Islands west of Scotch Cap Light (164° 44' W long.) and all Bering Sea waters of the Territorial Sea and EEZ north of Cape Sarichef (58° 39' N lat.). King crab in the Bering Sea north of Cape Romanzof and Tanner crab in Norton Sound are managed by ADF&G's Arctic-Yukon-Kuskokwim Region. The waters of the BSAI support the largest and most valuable commercial crab fisheries in Alaska.

The BSAI are divided into registration areas for king crab management and include districts of Registration Area J for Tanner crab, Dungeness crab and miscellaneous shellfish management. BSAI king and Tanner crab fisheries are managed under a federal fisheries management plan (FMP) that establishes a cooperative management structure deferring king and Tanner crab management to the state of Alaska with federal oversight. The Bering Sea hair crab fishery is managed solely under state jurisdiction, as are other crab and miscellaneous shellfish fisheries.

Species commercially harvested during 2004 in waters of the Bering Sea and Aleutian Islands (BSAI) include red king crabs *Paralithodes camtschaticus*, golden king crabs *Lithodes aequispinus*, scarlet king crabs *Lithodes couesi*, snow crabs *Chionoecetes opilio*, Tanner crabs *Chionoecetes bairdi*, grooved Tanner crabs *Chionoecetes tanneri*, triangle Tanner crabs *Chionoecetes angulatus*, Dungeness crabs *Cancer magister*, and giant Pacific octopus *Octopus dolfeini*. Historically, waters of the BSAI have supported commercial harvests of blue king crabs

Paralithodes platypus, green sea urchins *Strongylocentrotus droebachiensis,* pandalid shrimp, hair crab *Erimacrus isenbeckii, and* sea snails of several species, however these fisheries are currently either closed due to low abundance or are not being commercially pursued. In addition, a fishery for weathervane scallops *Patinopectin caurinus* occurs in the BSAI, however it is summarized in a separate report.

In 2004, 263 catcher vessels, eight catcher processors, eight floating processors and 16 shorebased processors were involved in harvesting and processing non-scallop shellfish resources in the BSAI. BSAI shellfish landings totaled approximately 45.7 million pounds generating an approximate exvessel value of $140 million.

The Bering Sea snow crab fishery was the largest shellfish fishery in Alaska with a total harvest of 23.9 million pounds, followed by the Bristol Bay red king crab fishery with a total harvest of 15.4 million pounds and the Aleutian Islands golden king crab fishery with a total harvest of 5.6 million pounds.

In addition to the fisheries previously mentioned, there was a fishery for golden king crabs in the Pribilof District with a 0.15 million pound guideline harvest level (GHL) and a fishery for grooved Tanner crab in the Bering Sea (0.2 million pound GHL). Scarlet king crabs were taken incidentally in the Aleutian Islands golden king crab and Bering Sea grooved Tanner crab fisheries. Fisheries for red and blue king crabs in the Pribilof District, for blue king crabs in the Saint Matthew Island Section and for red king crabs in the Aleutian Islands were closed due to low abundance. Both the Saint Matthew Island and Pribilof blue king crabs stocks have been declared overfished.

While the Bering Sea snow crab fishery was open in 2004, the harvest was well below the long-term average. The Bering Sea Tanner crab fishery was closed due to low abundance, as was the western Aleutian Islands Tanner crab fishery. Both the Bering Sea Tanner and snow crab stocks have been declared overfished. A commercial fishery was conducted in the Eastern Aleutian Tanner crab District with a 135,110 pound GHL.

Dungeness crab harvests in the BSAI have historically been small. One boat registered to fish for Dungeness crab during the 2004 season, thus all harvest information is confidential

Relative to other portions of the Westward Region, the BSAI area has never supported large harvests of shrimp. No vessels registered to harvest shrimp in 2004.

2004 saw little participation in most BSAI fisheries for miscellaneous shellfish species. The Bering Sea hair crab fishery was closed due to low abundance and there was no effort targeting green sea urchins or sea cucumbers. Giant Pacific octopuses were harvested incidentally in BSAI groundfish fisheries and in a directed state waters fishery.

Both state and federal management agencies and the public have come to rely on shellfish observer data to provide information on the targeted and non-targeted portions of the catch. All vessels that process crabs at sea are required to be observed and catcher vessel observer coverage is either full or partial depending on the fishery. Vessels that process at sea pay for observer coverage, while catcher vessels, depending on the fishery, either pay for coverage or the department pays for the coverage with test fish funds.

Pot limits for BSAI crab fisheries were implemented in 1992. ADF&G currently issues buoy tags to enforce the various pot limits. This report summarizes the activities of the BSAI buoy tag program.

ANNUAL MANAGEMENT REPORT FOR THE COMMERCIAL AND SUBSISTENCE SHELLFISH FISHERIES OF THE ALEUTIAN ISLANDS, 2004/05

Karla L. Bush, Myke Bon, and Michael E. Cavin, Jr.

Dutch Harbor Area Office, P. O. Box 920587, Dutch Harbor, Alaska 9969

ALEUTIAN ISLANDS KING CRAB MANAGEMENT AREA

DESCRIPTION OF AREA

The Aleutian Islands king crab Registration Area O has as its eastern boundary the longitude of Scotch Cap Light (164° 44' W long.), its northern boundary a line from Cape Sarichef (54° 36' N lat.) to 171° W long., north to 55° 30' N lat., and as its western boundary the Maritime Boundary Agreement Line as that line is described in the text of and depicted in the annex to the Maritime Boundary Agreement between the United States and the Union of Soviet Socialist Republics signed in Washington, June 1, 1990 (Figure 1-1). Area O encompasses both the waters of the Territorial Sea (0-3 nautical miles) and waters of the Exclusive Economic Zone (3-200 nautical miles).

ALEUTIAN ISLANDS RED KING CRAB

Historical Background

Historically, the red king crab *Paralithodes camtschaticus* resource in the Aleutian Islands was harvested in two registration areas. The Adak Registration Area (Area R) consisted of those waters in the Aleutian Islands west of 171° W long., while the Dutch Harbor Registration Area (Area O) encompassed waters east of 171° W long., (Figure 1-2). In addition, as the fleet moved westward, a third Registration Area (Area S) was established for the waters around Amchitka Island and the Petrel Bank. Area S was created in 1967 and was merged into Area R in 1978 (ADF&G 1991). In March of 1996, the Alaska Board of Fisheries (BOF) established the Aleutian Islands king crab Registration Area (Area O) by combining the existing Dutch Harbor and Adak Registration Areas. The BOF adopted this change to improve management of the increasingly important golden king crab *Lithodes aequispinus* resource in the Aleutian Islands. Combining the Adak and Dutch Harbor Areas was not expected to impact management of red king crabs in the Aleutian Islands (ADF&G 1999a).

Domestic fisheries for red king crabs in both the Adak and Dutch Harbor Registration Areas began in 1961, with effort and harvest increasing rapidly in both areas. Maximum production of 33 million pounds in the Dutch Harbor Area was reached in 1966/67 (Table 1-1, Figure 1-3). The Aleutian Islands red king crab fishery had a maximum fishery value of nearly $20 million in the 1980/81 season (Table 1-2). Fluctuating harvest levels from one year to the next characterized the fishery in the Dutch Harbor, and by the 1982/83 season the fishery had declined to a harvest of 430,000 pounds. Commercial fishing for red king crabs in the Dutch Harbor Area was closed on an annual basis after the 1982/83 season.

The Adak Area reached a peak harvest of 21 million pounds in 1964/65. The fishery remained open through the 1995/96 season when only 39,000 pounds were harvested. After the 1995/96 season the Adak fishery was closed for several years. Portions of the area were opened during the 1998/99, 2000/01, and 2001/02 seasons in order to assess the status of red king crab stocks.

Observers have been required on all crab catcher-processor vessels since 1988/89 and on catcher vessels targeting red and golden king crabs in the Aleutian Islands since 1995/96. Observer coverage on golden king crab vessels provides red king crab bycatch data from that fishery, although red king crab bycatch in golden king crab gear is minimal due to the limited overlap in distribution of the two species. Observer coverage provides data on retained and non-retained crabs as well as information related to fishing patterns (i.e. areas fished, avg. depth and soak time).

In October of 1996, a catcher-processor vessel targeting golden king crab in the Petrel Bank area reported significant bycatch of red king crabs at depths below 200 fathoms. As a result of these reports, ADF&G initiated a tagging project with the help of the onboard observers. The goals of this project were to enumerate, tag, and collect biological data from all red king crabs captured and to recapture tagged individuals. From November of 1996 through February of 1998, a total of 926 crabs were tagged along the north side of Amchitka Island and along the south side of Semisopochnoi Island. Of the tagged crabs, 440 were legal males and 160 were females; 89% of legal crabs were new shell. Recovery efforts yielded 15 tagged crabs, six of which were legal males. While the tagging was too limited to provide quantitative stock assessment data, it did provide some information related to migration, molting cycle, and seasonal distribution (Byersdorfer 1998).

In order to assess the status of red king crab stocks in two areas of the Aleutian Islands where the department had little recent abundance information, a limited commercial fishery was opened on November 1, 1998 with the provision that crabs not harvested (sublegal male and female crabs) be tagged and released. In addition, vessel operators were required to document all red king crab fishing activities in a pilothouse logbook. East of 179° W long., a GHL of 5,000 pounds was established and west of 179° E long., a GHL of 10,000 pounds was set: these GHLs were set using historic catch distribution information. Closed waters included the Petrel Bank, between 179° E long. and 179° W long. The department did not open the Petrel Bank area in 1998/99 since prior efforts had provided some population data from that area (Byersdorfer 1998).

Three vessels registered to harvest red king crabs in the Aleutian Islands during the 1998/99 season, but only one recorded any landings. The GHL was not reached in either open area and the fishery was closed by emergency order on July 31, 1999. Observers were required on all vessels participating in the 1998/99 fishery.

In order to address concerns for red king crab abundance in the Petrel Bank area, two surveys were conducted in January/February and November, 2001. Due to budget constraints, the survey was designed so fishers could retain and sell all legal male red king crabs captured to cover survey expenses. The commissioner’s permit specified stations to be fished, soak times and effort levels.

Capture of red king crabs from both of the 2001 surveys in the Petrel Bank area indicated healthy levels of legal males. CPUE (catch per unit of effort, defined as number of legal crabs per pot lift) for the combined surveys was 28. Survey CPUEs are not directly comparable to previous commercial fishery CPUEs because pot lifts in prior commercial fisheries were not conducted in a systematic manner and may have occurred in different fishing locations (Bowers et al. 2002). Sublegal male and female CPUE for the combined surveys was two and three, respectively.

Size frequency data from the 2001 surveys were comparable to the size composition that was found in catches prior to the 1996/97 fishery closure. The size frequency indicated that approximately 61% of the sampled legal-size crabs were post recruits. Of the crabs sampled 77% were new-shell. Similar to the surveys conducted in the mid 1990s, very few sublegal crabs were captured during the 2001 surveys.

The surveys conducted in 2001 indicate that legal male abundance has increased since the fishery was closed in 1996/97, however, red king crab female and sublegal abundance remains low. Given the legal male abundance, a limited commercial fishery on the Petrel Bank was opened during the 2002/03 and 2003/04 seasons with a GHL of 500,000 pounds. Based on expected effort, this was considered the minimum GHL that could be managed inseason. Because of the uncertainty in the status of sublegal and female red king crabs and to provide for overall stock protection, the department adopted a management strategy that would close the fishery prior to achieving the GHL if legal male CPUE dropped below 10 crabs/pot. Establishing a low GHL with a moderate CPUE threshold level should help prevent the stock from declining to levels seen in the mid-90s. Trends in fishery performance were used to evaluate stock status and a defined threshold for closing the fishery permitted clearer understanding of the management strategy. Prior to opening a commercial fishery in other portions of the western Aleutians, the department will need to conduct surveys similar to those performed on the Petrel Bank.

Thirty-three vessels participated in the 2002/03 Petrel Bank red king crab fishery. The fleet pulled 3,782 pots, an average of 115 pots per vessel. CPUE for the Petrel Bank was 18 legal crabs per pot lift and the fleet harvested a total of 505,642 pounds. Exvessel price averaged $6.51 per pound and the fishery had a total value of over $3.29 million (Table 1-2).

During the 2003/04 Petrel Bank red king crab fishery a total of 479,113 pounds were harvested by 30 vessels in 91 hours. The fleet pulled 5,774 pots and average CPUE was 10 legal crabs per pot lift. Exvessel price averaged $5.14 per pound and the fishery had a total value of nearly $2.45 million (Table 1-2)

In addition to commercial fisheries, long-standing subsistence and sport fisheries have targeted red king crabs in the vicinity of Unalaska Island. To gather subsistence harvest data, the department has periodically required fishers to obtain a harvest permit and log sheet. Historically, few of the permits were returned and the program was discontinued in 1994. On average, 15 permits were returned per year. The reported average annual harvest was 135 king crabs.

To address conservation concerns for the eastern Aleutian Islands red king crab stock, the BOF took action at the March 1999 meeting regarding the subsistence and sport king crab fisheries in that portion of the Aleutian Islands between 168° and 164° 44’ W long. Regulations were adopted by BOF that closed the sport fishery and reduced the daily bag limit of subsistence king crabs from six to one per person per day. BOF also adopted regulations requiring that subsistence king and Tanner crab fishers operating in the Aleutian Islands between 168° and 164° 44’ W long. obtain a subsistence permit before fishing.

Subsistence logsheet information has been collected by the department for the past six years. An average of 218 permits are issued each year and approximately 71 percent are returned. The returned permits accounted for an average annual harvest of 664 king crabs, with harvest ranging from zero to 76 king crabs per permit. Estimates generated from the subsistence harvest logsheets indicate an average of approximately 902 king crabs are taken per year, although in recent years the harvest has been much lower (Table 1-3). These recent harvest figures are substantially less than estimates generated by a 1994 survey of 15.1% of households in Unalaska, where 6,892 king crabs were estimated to have been taken (ADF&G 1999b).

2004/05 Commercial Fishery

The red king crab commercial fishery in the Aleutian Islands Registration Area O was not opened during the 2004 season due to low stock abundance.

2004 Subsistence Fishery

In 2004, ADF&G in Dutch Harbor issued 225 subsistence permits and harvest logsheets, of which 144, or 64%, have been returned. The returned permits accounted for a harvest of 201 king crabs (Table 1-3). Estimates generated from the subsistence harvest logsheets indicate that approximately 314 king crabs were taken with harvest ranging from zero to 36 king crabs per permit. The majority of subsistence caught king crabs were taken in Unalaska Bay (45%) and Captain’s Bay (30%). Ninety-four percent of the red king crabs were taken with pot gear and 6% were taken with dive gear. The average CPUE was <1 legal crab per pot. Thirty-one percent of the red king crabs were harvested in January.

Fishery Management and Stock Status

A vessel may be registered to fish in the commercial red king crab and golden king crab fisheries concurrently; however, only single line pots may be operated in areas open to red king crab fishing and only longline pots may be operated in areas open to golden king crab fishing. Likewise, red king crab may only be retained from single line pots and golden king crab may only be retained from longline pots. Golden king crab fisheries in the Aleutian Islands are not restricted by pot limits. In the Petrel Bank red king crab fishery the fleet may operate no more than 1,250 total pots.

Western Aleutian Islands pot surveys conducted from 1975 to 1977 provided CPUE, fecundity, and relative abundance information of red king crabs (ADF&G 1978). Pot surveys were conducted on an annual basis in the Dutch Harbor Area until 1990 when trawl surveys were implemented to survey larger areas in a more timely fashion and to reduce gear selectivity inherent to pot fishing activities (Urban 1992). In the late 1970s, GHL ranges were established using a blend of pot survey results and fisheries data. Historic fishery GHLs set in the late 1970s ranged from 8 million to 26 million pounds for Dutch Harbor and from 0.5 million to 3.0 million pounds in Adak (ADF&G 1978). GHLs were often modified inseason based on fishery performance.

Bottom trawl surveys of the waters around Unalaska Island were conducted in 1991, 1994, 1995, 1999, 2000, 2003 and 2004. Recent bottom trawl surveys have not captured many king crabs. In 1995, only two red king crabs were caught, thus no population estimate could be generated. During the 1999 survey, 72 red king crabs were caught, one of which was a legal male. All others were pre-recruit males and small females captured in a single tow made in Kalekta Bay (Worton 2000). A single red king crab was captured during 2000 and 2003 (Spalinger 2004 and Worton 2001), indicating that the red king crab population in the eastern Aleutian Islands remains severely depressed.

In November of 2002 the department conducted a survey similar in design to the Petrel Bank surveys of 2001 in the area between 172° W long. and 179° W long. The survey area was developed in consultation with Industry and focused on areas of historic red king crab abundance in the Adak, Atka, and Amlia Islands areas that have been closed to commercial red king crab fishing since the 1998/99 season and had not been previously surveyed. The survey had a total of 116 stations that were divided between state-waters (56 stations) and federal-waters (60 stations).

Ten vessels surveyed a total of 61 stations composed of 1,085 pot lifts. Survey catches were poor and only four legal males were captured during the entire survey. Due to poor survey catches and high operation costs, many vessels were unable to fulfill their survey commitment and only 34% of the survey was completed. The portion of the survey that was completed indicates that the red king crab stocks around Adak, Atka, and Amlia Islands continue to be severely depressed. Therefore, the department does not expect a commercial red king crab fishery to open in this area in the near future (Granath 2003).

Shell-age and size composition data from the 2001 pot surveys and the 2002/03 and 2003/04 commercial fisheries in the Petrel Bank area indicate that the stock is primarily older, post-recruit crabs. Proportions of sublegal and female red king crabs was low and did not change significantly from the 2001 surveys to the 2002/03 or 2003/04 commercial fisheries. Average weight and length of legal male red king crabs increased from the surveys to 7.4 pounds and 162 mm in 2002 and up to 8.0 pounds and 168 mm in 2003.

Petrel Bank cumulative fishery CPUE did not drop below the benchmark of 10 during the 2003/04 fishery, although fish ticket data indicated that the final fishery CPUE was 10 crabs per pot. Fishery CPUE climbed during the first 36 hours of fishing from 8.5 to 15.0 crabs per pot and steadily dropped for the remainder of the fishery with the exception of the morning of October 28, when most pots had soaked for an additional 12 hours. Compared to the combined 2001 survey CPUE of 28 and 2002/03 commercial fishery CPUE of 18, performance during the 2003/04 commercial fishery was not promising. Based on fishery performance and the lack of recruitment of legal-sized crabs, it is likely that the fishery would fail to stay above the threshold criteria of 10 crabs per pot if a fishery were prosecuted in 2004/05.

The harvest approach using only legal-male CPUE as a threshold was developed to help maintain multiple size and age classes on the grounds to promote rebuilding. Using a threshold of legal male CPUE does not protect the entire stock. Because survey catch of sublegal and female crab was low, thresholds were not developed for those stock components. After the 2001 surveys, staff expressed concern of overall stock status. While legal male catch was encouraging, the lack of sublegal and female crab was disappointing. The department now has two additional years of fishery information, which have failed to indicate healthy levels of sublegal male and female crab stock components. In order to ensure the long-term reproductive viability of the stock and conservation of the resource for rebuilding, the fishery remained closed in 2004/05.

A mode of sublegal crab centered at 86 – 90 mm is approximately three molts from attaining legal size. The department plans to conduct a Petrel Bank survey during the fall of 2006. Survey results will be compared to previous surveys to evaluate stock status.

ALEUTIAN ISLANDS GOLDEN KING CRAB

Historic Background

The golden king crab *Lithodes aequispinus* fishery in the Aleutian Islands has never failed to open due to low stock abundance, making it unique among Westward Region king crab fisheries. Golden king crabs inhabit greater depths than other commercially exploited king crabs (Blau et al. 1996). The depths and steep bottom topography of the Aleutian Island passes, inhabited by golden king crabs, necessitate the use of longline rather than single-pot gear. No other major king crab fisheries in Alaska exist where longline pot gear is the only legal gear type.

Historically, golden king crabs were taken as incidental harvest during red king crab fisheries in the Adak (Area R) and Dutch Harbor (Area O) Registration Areas. One landing of golden king crabs was reported from the Adak Area during the 1975/76 season, but directed fishing for golden king crabs did not occur in either management area until the 1981/82 season (ADF&G 1984). From the 1981/82 season until the 1996/97 season, the golden king crab resource in the Aleutian Islands was harvested in two directed fisheries occurring in the Adak and Dutch Harbor Registration Areas.

During the 1981/82 season, 14 vessels landed 1.2 million pounds of golden king crabs in 76 deliveries from the Adak Area (Table 1-4). By the following season, harvest had reached 8.0 million pounds with 99 vessels participating in the fishery. Between 1981 and 1995, an average of 49 vessels participated in the Adak golden king crab fishery, harvesting an average of 6.9 million pounds annually. Peak harvest in the Adak fishery occurred during the 1986/87 season when 12.8 million pounds of golden king crabs were harvested for an exvessel value of $37.6 million (Table 1-5). No stock assessment of the golden king crab population was performed in the Adak Area and initially the fishery was managed based on size, sex, and season restrictions. Catches were monitored inseason (ADF&G 1999a) and after the initial fishery, harvest levels were set based on harvest expectations generated from catch in prior seasons (ADF&G 1983a). The majority of golden king crabs harvested in the Adak Area were taken in the North Amlia and Petrel Bank Districts; however, significant harvest also occurred in the Western Aleutian District (Figure 1-2).

From the 1981/82 season to the 1995/96 season, average weight of golden king crabs harvested in the Adak Area fishery declined from 5.5 to 4.2 pounds and CPUE declined from 10 to five legal crabs per pot pull (Figure 1-4). In July 1985, BOF adopted a regulation reducing the minimum legal size for golden king crabs from 6.5 to 6.0 inches in carapace width (CW). Decreasing the legal size for golden king crabs in this area resulted in an expected decrease in average weight of legal crabs harvested after the 1985/86 season and increased catch during the 1985/86 and 1986/87 seasons. This regulation change did not, however, reverse the trend of slowly declining catch rates in the area west of 171° W long.

Initial catches of golden king crabs in the Dutch Harbor Area were similar to those observed in the Adak Area fishery (ADF&G 1984). Harvest was incidental to the red king crab fishery and effort in the fishery only increased as red king crab stocks decreased in abundance. Six vessels harvested approximately 116,000 pounds of golden king crabs during the 1981/82 Dutch Harbor red king crab season (Table 1-4). By the following season, 49 vessels were participating in the directed golden king crab fishery, harvesting 1.2 million pounds. Between 1981 and 1995, an average of 18 vessels harvested approximately 1.5

million pounds of golden king crabs annually (Figure 1-5). Peak golden king crab harvest in the Dutch Harbor Area occurred during the 1995/96 season when 2.0 million pounds were harvested for an exvessel value of $5.2 million (Table 1-5). The Dutch Harbor Area harvest was primarily from the Islands of Four Mountains and Yunaska Island area (Figure 1-1).

In general, average weight of golden king crabs harvested in the Dutch Harbor Area declined during the period from 1981 to 1995, ranging from a high of 7.6 pounds in the 1983/84 season to 4.1 pounds during the 1992/93 season (Figure 1-5). CPUE has slowly declined throughout the history of this fishery, reaching a peak of 14 legal crabs per pot during the 1984/85 season and declining to 6 crabs during the 1994/95 season. The golden king crab stock in the Dutch Harbor Area was not surveyed for abundance prior to 1991 and the fishery was managed based on a historical average catch of 1.5 million pounds annually (ADF&G 1999a). In 1984, BOF adopted an ADF&G staff proposal to lower the legal size for golden king crabs in the Dutch Harbor Area from 6.5 inches to 6.0 inches CW and to establish the area as a permit fishery.

At its March 1996 meeting, BOF chose to restructure management of king crabs in the Aleutian Islands. Formerly, the Aleutian Islands king crab populations had been managed using the Adak and Dutch Harbor Registration Areas that were established for red king crab fisheries. However, during the 1970s and 1980s, red king crab fisheries declined in the Aleutian Islands while the golden king crab fishery gained increasing importance. Consequently, BOF felt that king crab management areas in the Aleutian Islands should be redesigned to more accurately reflect current golden king crab stock distribution and patterns in fishing effort. BOF, therefore, elected to combine the Adak and Dutch Harbor Areas to form the Aleutian Islands Registration Area O and directed ADF&G to manage the golden king crab in the areas east and west of 174° W long. as two distinct stocks. It also stipulated that a conservative management plan be initiated and that all vessels registered for the fishery continue to carry an onboard observer for all of their fishing activities.

In 1996/97, when the initial golden king crab fishery in the new king crab Registration Area O occurred, a GHL of 3.2 million pounds was established for the area east of 174° W long., and 2.7 million pounds for the area west of 174° W long. Compared to the combined Adak and Dutch Harbor Area fisheries from prior years, there was reduced effort and harvest during the 1996/97 fishery. Eighteen vessels harvested 5.9 million pounds, down from 28 vessels taking 6.9 million pounds in 1995/96. This reduction in effort was likely due to the departure of vessels for the 1996 Bristol Bay red king crab season, which re-opened to commercial fishing for the first time since 1993. The eastern portion of Area O closed by emergency order on December 25, with a harvest of 3.3 million pounds, while the western portion was open for the entire registration year with a harvest of 2.6 million pounds.

During the 1996/97 fishery, the CPUE east of 174° W long. was six legal crabs per pot and the average weight was 4.5 pounds per crab. Most fishing effort was concentrated in the area around Yunaska Island and the Islands of Four Mountains with some effort in the Seguam and Amukta Pass areas (Figure 1-2). In the portion of Area O west of 174° W long., fishery performance was six legal crabs per pot pull with an average weight of 4.2 pounds per crab (Table 1-4). Most harvest occurred between Amchitka Pass and Buldir Island. The 1996/97 golden king crab fishery in the Aleutian Islands had an estimated exvessel value of $12.5 million (Table 1-5).

Since the 1996/97 season, effort and harvest in the Aleutian Islands east of 174° W long. have remained relatively stable. During the 1997/98 season, 15 vessels harvested 3.5 million pounds in an 84-day season. CPUE averaged seven legal crabs per pot lift and harvested crabs averaged 4.5 pounds each. The fishery west of 174° W long. has experienced greater variability in catch and effort. During the 1997/98 season, eight vessels participated in the fishery and harvested 2.4 million pounds. The GHL west of 174° W long. was not reached and the fishery was not closed. The fleet averaged seven legal crabs per pot lift west of 174° W long. with landed crabs averaging 4.3 pounds each. The 1997/98 Aleutian Islands golden king crab fishery had an exvessel value of $12.5 million.

Prior to the 1998/99 season, the golden king crab GHL east of 174° W long. was reduced from 3.2 million pounds to 3.0 million pounds. Fishery performance trends and data from tag recoveries indicated that the 200,000 pound GHL reduction for the area east of 174° W long. was necessary in order to comply with the overfishing definition specified in the Fishery Management Plan (FMP) for the king and Tanner crab fisheries of the Bering Sea and Aleutian Islands (NPFMC 1998). The FMP specifies that the golden king crab stock in the Aleutian Islands is considered overfished when fishing mortality (F) exceeds 0.2 (NPFMC 1998). A fishing rate of F=0.2 corresponds to an annual mature male removal rate of approximately 18%. During the 1997/98 season, the GHL of 3.2 million pounds in the area east of 174° W long. was exceeded by approximately 300,000 pounds. Therefore, to maintain a long-term average harvest at 3.2 million pounds, the 1998/99 GHL in this area was reduced to 3.0 million pounds (D. Pengilly, ADF&G, Kodiak, personal communication).

The 1998/99 fishery east of 174° W long. was similar to the prior two fisheries. Fourteen vessels registered and harvested 3.2 million pounds in a 68-day season. The catch accrued at an average rate of nine legal crabs per pot lift with landed crabs averaging 4.4 pounds each. West of 174° W long., effort declined significantly from the prior two seasons. The vessels averaged 12 legal crabs per pot lift with landed crabs averaging 4.1 pounds each. The 1998/99 fishery had an exvessel value of $9.3 million, the lowest in 14 years.

In July 1999, BOF adopted a regulation to move the Registration Area O golden king crab fishery from September 1 to August 15 in order to accommodate fishers that participate in both the golden king and Bristol Bay red king crab (BBRKC) fisheries. The BBRKC fishery opening date had been moved from November 1 to October 15, which reduced the amount of fishing time available to the golden king crab fleet prior to the Bristol Bay opening. The change in opening date for Area O was designed to provide adequate fishing time for the golden king crab fleet to harvest the GHL east of 174° W long., prior to the opening of the BBRKC fishery.

In 2000/01, the fishery east of 174° W long. continued the stable trend seen in the previous four years. Fifteen vessels registered and harvested 3.1 million pounds. The CPUE was 10 legal crabs per pot, with a 4.5-pound average weight per crab. West of 174° W long., a fleet of 12 vessels harvested 2.9 million pounds. The CPUE was seven legal crabs per pot, while the average weight per crab was 4.1 pounds. With an exvessel value of just under $19.5 million, the 2000/01 season was the most valuable golden king crab fishery in six years (Table 1-5).

These stable trends have continued through the 2003/04 fishery. In the area east of 174° W long., since the 2001/02 season, 18 to 19 vessels have participated and harvested an average of 2.99 million pounds per year. The CPUE and average weight have not changed significantly with an average of 11 to 12 legal male crab per pot lift and legal males averaged 4.4 to 4.6 pounds each. In the area west of 174° W long, six to nine vessels have harvested an average of 2.69 million pounds per year (Table 1-4). The average weight and CPUE have not changed significantly with legal males averaging 4.0 pounds each and an average of seven crabs per pot lift, with the exception of the 2003/04 fishery when average CPUE increased to 10 legal crabs per pot lift. Exvessel values for the 2001/02, 2002/03 and 2003/04 seasons were $18.13, $18.26 and $20.16 million, respectively (Table 1-5).

The number of vessels fishing and the average number of pots per vessel in the eastern portion of the Aleutian Islands golden king crab fishery has remained fairly constant during the past ten years (Figure 1-6). In the western portion of the Aleutian Islands golden king crab fishery, there has been a decrease in the number of vessels registered per season with a dramatic increase in the number of pots registered per vessel, especially in the past six years (Figure 1-7). With the adoption of longline gear in 1986, vessels became more specialized in fishing for golden king crabs and were able to more efficiently operate gear. In recent years, with shorter Bristol Bay red king and Bering Sea snow crab fisheries, those longline vessels that also fish in the Bering Sea have increased their effort in the Aleutian Islands. While the total number of vessels registered has remained relatively low since the early 1990s, the amount of time relative to other crab fisheries that these vessels spend fishing in the Aleutian Islands has increased, resulting in shorter golden king crab fisheries. The expansion of processing facilities in Adak has also contributed to the shorter seasons, especially in the western Aleutians. Vessels can now deliver closer to the fishing grounds, which saves approximately a week in transit time for each delivery.

2004/05 Fishery

The 2004/05 Aleutian Islands golden king crab fishery opened by regulation at 12:00 NOON August 15 with a GHL of 5.7 million pounds; 3.0 million pounds of which was apportioned to the area east of 174° W long., and 2.7 million pounds apportioned to the area west of 174° W long. Twenty-two vessels participated in the fishery and landed 5.58 million pounds. The fleet averaged 14 legal crabs per pot lift, up from 11 the prior season, and landed crabs averaged 4.2 pounds each which is slightly less than the 2003/04 season (Table 1-4).

East of 174° W long.

A total of 19 vessels participated in the golden king crab commercial fishery east of 174° W long. The fleet registered 13,165 pots, or 693 pots per vessel, similar to the 2003/04 fishery when 12,518 pots, or 699 pots per vessel, were registered. Most fishing effort was concentrated around Yunaska Island, Islands of Four Mountains, and in Seguam and Amukta Passes. Catch rates tended to be highest in Amukta and Yunaska Passes, with the most productive grounds yielding up to 23 legal crabs per pot lift, compared to 14 crabs per pot lift in this area the pervious season (Table 1-6, Figure 1-8). The average catch rate for the entire eastern portion was 18 crabs per pot lift, up from 11 crabs per pot lift the previous season. The average weight of legal crabs was 4.5 pounds, a decrease from 4.6 pounds during the 2003/04 season, with the largest crabs encountered around Yunaska Island (Table 1-6).

The fleet harvested 2.89 million pounds of golden king crabs in two weeks of fishing. Three shore-based processors in Dutch Harbor and one in Adak processed golden king crabs from the eastern Aleutian Islands. Exvessel price for live, whole crabs averaged $3.18 per pound, leading to a fishery value of $9.05 million, a decrease of one million dollars from the 2003/04 fishery (Table 1-5). A fishery closure announcement was issued to the fleet on August 25, providing the fleet with four days advance notice of the August 29 closure.

West of 174° W long.

A total of six vessels participated in the fishery west of 174° W long., three vessels began at the fishery opening on August 15, and an additional three joined the fishery after the closure of the eastern portion of the Aleutian Islands. The fleet registered 7,240 pots, an average of 1,207 pots per vessel, an increase from the previous season when 7,140 pots or an average of 1,190 pots per vessel were registered (Table 1-4). Fishing effort was concentrated around the Delarof Islands, Amchitka Pass and the Petrel Bank. Weekly catch rates ranged from six to 15 crabs per pot lift and averaged 12, which is up from ten crabs per pot lift the previous season. The average weight of legal crab was 3.9 pounds, a slight decrease from the 2003/04 season average weight of 4.0 pounds. The largest crabs were harvested from around Adak Island (Table 1-6).

The fleet harvested 2.68 million pounds of golden king crab in 21 weeks of fishing, four weeks faster than the previous season, and the shortest season west of 174° W long. on record. Landings averaged 137,000 pounds per week with a maximum weekly landing of 226,824 pounds. Golden king crabs were purchased and processed by one catcher-processor and by three shore-based processors, one in Adak and two in Dutch Harbor. Exvessel price averaged $3.09 per pound for live, whole crabs, yielding a total fishery value of $8.16 million, slightly below the 5-year average fishery value of $8.80 million. A fishery closure announcement was issued to the fleet on December 27, providing one-week advance notice to the fleet of the January 3 closure.

Fishery Management and Stock Status

The Aleutian Islands golden king crab fishery is managed using two sources of inseason fishery data. Processors report landed catch to ADF&G weekly or more frequently as requested. These reports are the primary source of inseason harvest information. Observers stationed on each vessel participating in the fishery report average weight and catch rate information that is used in conjunction with landed catch to develop inseason projections of fishery length.

The department surveyed a small portion of the golden king crab habitat in the Aleutian Islands during the summer of 1997 (Blau et al. 1998). Prior to that, the department performed the only survey of this area in 1991 (Blau and Pengilly 1994). Only a small but commercially important portion of the area in which golden king crabs are harvested is currently surveyed. Mark-recapture data from the 1997 survey suggested that the commercial fishery was annually removing a minimum of 20% of the legal male crabs present in the area surveyed.

The stations surveyed in 1997 were surveyed again in 2000 and 2003. Tag recovery rates changed only slightly even though approximately one-third fewer legal-sized male crabs were tagged in 2000 than in 1997. Harvest rates as indicated by tag returns in the 2000/2001 season were similar to those in 1997/98. Shell-age composition data indicated the stock is healthy, while size composition of the retained catch has changed very little (Watson and Gish 2002). Preliminary results from the 2003 survey indicate that overall approximately 22% fewer crab were tagged compared to the 2000 survey although numbers of tagged legal males were similar. Results from the 2003 survey and subsequent tag recoveries will be available in a report later this year.

Even though the harvest rates are at or near the allowable maximum in some areas, the Aleutian Islands golden king crab population appears healthy. Portions of the stock occur at depths greater than those fished. Additionally, the area surveyed receives more fishing pressure than many other areas in the entire Aleutian Islands, so golden king crabs in less heavily fished locales may have a lower harvest rate. In order to operate their gear more efficiently, fishers tend to utilize the shallowest waters in which crabs may be found in abundance. Distribution of legal males extends to depths greater than those fished, so the entire depth range distribution of legal males is not exploited. Recent fishery data also indicates that the stock is healthy. Average size of crabs harvested has remained nearly constant for the last six seasons. Average weight has been between 4.3 and 4.6 pounds per crab for the last ten years. Catch per unit of effort has also been stable and has been above the 10-year average during the last four seasons. All this information suggests that the 3.0 million-pound GHL has provided a stable fishery and protects against overfishing as defined in the FMP. Currently, the department intends to survey the area around Amukta and Yunaska Islands every three years, with the next survey scheduled for the summer of 2006.

In the Aleutian Islands west of 174° W long., no surveys are conducted. The 2.7 million-pound GHL has been in effect since the 1996/97 season and was determined on the basis of the preceding 5-year average harvest in the waters west of 174° W long. Fishery and observer data do not demonstrate a compelling reason to change the GHL from 2.7 million pounds as fishery statistics have not markedly changed since it was developed in 1996/97.

ALEUTIAN ISLANDS SCARLET KING CRAB

Historic Background

Scarlet king crabs *Lithodes couesi* are currently harvested under authority of a permit issued by the commissioner of ADF&G and authorized in 5 AAC 34.082. PERMITS FOR *LITHODES COUESI* KING CRAB. These permits are usually issued in conjunction with an Aleutian Islands golden king crab registration. Scarlet king crabs are typically found in waters deeper than 200 fathoms and have been taken as incidental harvest in the golden king crab and deepwater Tanner crab fisheries in the Aleutian Islands. Limited directed fishing has occurred; however, exploratory fishing does not indicate that a large biomass is present. Since 1992, annual harvest of scarlet king crabs in the Aleutian Islands has ranged from less than 5,000 pounds to a peak of nearly 63,000 pounds in 1995, when eight vessels made 21 landings.

Exvessel value was at a maximum in 1995 when the fishery was worth approximately $187,000 (Table 1-7). Since 1996, effort and harvest in this fishery have been minimal and catch information has been confidential in all years except 1997 when 6,700 pounds were harvested. When BOF combined the Adak and Dutch Harbor king crab Registration Areas to create Area O, management of scarlet king crabs was not impacted (ADF&G 1999a).

2004 Fishery

In 2004, three vessels registered to retain scarlet king crab bycatch during the grooved Tanner and golden king crab fisheries. Harvest information is confidential since less than three processors purchased crab.

Fishery Management and Stock Status

No surveys are conducted, nor are any estimates of population abundance made for scarlet king crabs in the Aleutian Islands; consequently, stock status and distribution are not well known. There is little stock assessment data and the stock appears small and geographically limited to deep-water areas. Scarlet king crab males larger than or equal to five and one-half inches in CW may be taken as incidental harvest up to 20% of the directed fishery under the conditions of a commissioner's permit. No directed fishing for scarlet king crabs is anticipated prior to adoption of a plan for new and developing fisheries by the BOF. Future directed fisheries for scarlet king crabs would be conducted in accordance with the provisions of that plan. Observer coverage on each vessel registered for the king crab fisheries of the Aleutian Islands has provided biological information that will be used by the department to develop future management measures for scarlet king crab.

EASTERN ALEUTIAN TANNER CRAB DISTRICT

DESCRIPTION OF AREA

The Eastern Aleutian Tanner crab District (EAD) encompasses all waters of Registration Area J between the longitude of Scotch Cap Light at 164° 44' W long., west to 172° W long., and south of the latitude of Cape Sarichef at 54°36' N lat. (Figure 1-9). Area J encompasses both waters of the Territorial Sea (0-3 nautical miles) and waters of the Exclusive Economic Zone (3-200 nautical miles).

TANNER CRAB

Historic Background

The Eastern Aleutian District has not supported harvests of Tanner crabs *Chionoecetes bairdi* as large as those recorded in other districts of Area J. Tanner crabs are found only in a few major bays and inlets of the eastern Aleutians and the directed fishery was relatively small in volume and geographically limited until the late 1970s. The fishery began in Akutan and Unalaska Bays and subsequently expanded to include all areas of known Tanner crab distribution in the Eastern Aleutian District. Harvest of Tanner crabs over the last 26 years has typically remained under one million pounds per year. Only in the three consecutive seasons from 1976/77 to 1978/79 did the harvest exceed one million pounds, reaching a peak of 2.5 million pounds in the 1977/78 season (Table 1-8). Vessel participation was low in 1973/74, with only six vessels registered and reached a high of 31 vessels in 1982 when the fishery was in decline. Vessel participation declined in 1991 to five vessels and consequently the harvest reached a low of 50,038 pounds. The Eastern Aleutian Islands Tanner crab fishery reached a maximum exvessel value of approximately $950,000 in 1977/78 (Table 1-9). Commercial fishing for Tanner crabs has not been permitted in the Eastern Aleutian District from 1995 to 2002 due to low stock abundance.

Subsistence harvest-limit reductions applied to the Eastern Aleutian Islands red king crab fishery in 1999 were not applied to Tanner crabs. However, the permit and reporting requirements for subsistence harvest of Tanner crabs were reinstated. Between 1988 and 1994, an average of 15 subsistence permits per year were returned and accounted for approximately 121 Tanner crabs annually. A survey of 15.1% of Unalaska households in 1994 generated an estimated total subsistence Tanner crab harvest of 10,957 crabs (ADF&G 1999b). ADF&G staff issued 180 subsistence permits in 1999, of which 80 were returned.

Returned permits accounted for a Tanner crab harvest of 1,430 crabs and the estimated total harvest was 3,200 crabs (Table 1-3).

From 2000 to 2004, ADF&G in Dutch Harbor has issued an average of 218 subsistence permits and harvest logsheets. On average, 71 percent or 155 permits are returned. The returned permits account for an average annual harvest of 2,817 Tanner crabs and harvest ranged from zero to 915 crabs per permit. Estimates generated from the subsistence harvest logsheets indicate that an average of 4,060 Tanner crabs are harvested annually between 2000 and 2004, although in recent years the harvest has been much higher (Table 1-3).

2004 Commercial Fishery

The commercial Tanner crab fishery in the EAD opened at NOON, January 15, 2004. Only the Unalaska Bay and Makushin/Skan Bay portions of the Eastern Aleutian District were opened to commercial fishing with at GHL of 47,219 pounds in Unalaska Bay and 87,891 pounds in Makushin/Skan Bay. Preseason registrations were received from 25 vessels and based on he fishery limit of 300 pots, pot limits were set at 12 pots per vessel. Fourteen vessels using 168 pots participated in the fishery.

Unalaska Bay

Ten vessels fished in the Unalaska Bay portion of the EAD. The GHL was reached in four and a half days of fishing. Harvest information is confidential since less that three processors purchased crab (Table 1-8). Fishing effort was highly concentrated in Nateekin Bay. Legal crabs in Unalaska Bay averaged 2.35 pounds.

Makushin/Skan Bay

Nine vessels fished in the Makushin/Skan Bay portion of the Eastern Aleutian District. Fishing effort was geographically well distributed. The GHL was caught in 18 days and legal crab averaged 2.35 pounds each. Harvest information is confidential since less than three processors purchased crab (Table 1-8).

Dockside Sampling

Tanner crabs were sampled at dockside from deliveries during the course of the 2004 Eastern Aleutian District Tanner crab fishery. Confidential interviews were conducted with vessel captains to acquire detailed information regarding areas fished, effort and fishery performance. Biological data collected consisted of CW and shell-age.

The fishery had a total of 65 landings by 14 vessels, of which 49 landings were sampled by staff for confidential interviews and biological data during offloads. Approximately 16% of the crabs delivered in the 2004 EAD Tanner crab fishery were accounted for in the average weight sampling. Average weight for Tanner crabs harvested in the EAD fishery was 2.35 pounds. During the fishery 7% of the crabs delivered were sampled for CW and shell age. From the biological data collected, 70% of the crabs measured were new-shell, 26% old-shell and 4% were very old-shell (Figure 1-10). Average CW was 148 mm.

2004 Subsistence Fishery

In 2004, ADF&G issued 225 subsistence permits and harvest logsheets, of which 144, or 64%, have been returned. The returned permits accounted for a harvest of 4,417 Tanner crabs (Table 1-3). Estimates generated from the subsistence harvest logsheets indicate that approximately 6,902 Tanner crabs were taken with pot and scuba gear with harvest ranging from zero to 435 Tanner crabs per permit. The majority of Tanner crabs were taken in Unalaska Bay (65%) and in Iliuliuk Bay adjacent to the landfill and spit (14%), with peak harvest in June although catch continued throughout the year.

Fishery Management and Stock Status

In 2002 the BOF adopted new management measures for the Eastern Aleutian Tanner crab including pot limits, daily fishing periods and reporting requirements. A total of 300 pots are allowed in the fishery with no more than 50 pots per vessel. Pots may be operated to take Tanner crab only from 8:00 AM until 5:59 PM with a soak time of 14 hours from 6:00 PM until 7:59 AM. Fishers must report daily to the department the number of pot lifts, number of crab retained and any other information considered necessary for the management and conservation of the fishery.

Prior to 1990, sporadic pot surveys were utilized to generate a Tanner crab abundance index in the eastern Aleutian Islands (Urban 1992). The pot surveys were not utilized to generate a GHL; instead they were used to monitor trends in abundance and recruitment. Pot surveys and fishery data were used to establish harvest levels up to 250,000 pounds (ADF&G 1983b). Since 1990, trawl surveys have been used to estimate abundance and are used in conjunction with fishery data for management purposes.

Trawl surveys in 1990 and 1991 indicated that a surplus of 100,000 pounds of Tanner crab were available for harvest. Commercial fisheries that opened in 1991 and 1992 based on those surveys resulted in legal male harvests of 50,038 and 98,703 pounds respectively (Table 1-8). A 1994 trawl survey of the same location revealed an 87% decrease in abundance of Tanner crabs since 1991. Results of the 1994 survey prompted the department to issue an emergency order closing the 1995 season (ADF&G 1999b). A trawl survey conducted by the department in 1995 indicated that the abundance of Tanner crabs had increased slightly over the 1994 level, but was still well below levels observed on the 1990 and 1991 surveys. The 1995 survey found an increase in juvenile male and immature female crabs. However, the abundance of legal male crabs was still very low (Urban 1996); thus, the fishery closure was extended.

A trawl survey conducted in 1999 indicated that the biomass of Tanner crabs in the eastern Aleutian Islands had increased. Abundance increases were recorded for all size classes, with females and large males showing the greatest change. Female abundance more than doubled from the 1995 survey estimate to 2.2 million crabs, and male crab abundance increased nearly four-fold to just over 4.0 million crabs of which approximately 0.4 million were legal size. The majority of the recruitment was observed in Akutan, Unalaska, and Makushin Bays (Worton 2000).

Because encouraging recruitment was noted during the 1999 trawl survey, the department surveyed the eastern Aleutian Islands again in 2000. Much of the recruitment observed in Akutan Bay in 1999 was not encountered in 2000; thus the Tanner crab abundance estimate declined (Worton 2001).

A commissioner's-permit survey using pot gear, similar in design to the pot surveys for red king crab in the western Aleutians, was conducted in the EAD during January/February of 2003. The survey focused on areas of historic Tanner crab abundance in Unalaska Bay, Beaver Inlet and Akutan Bay. The pot survey included areas that are inaccessible to the trawl survey. Results from the 2003 pot survey indicated an increase in the abundance of Tanner crabs in Unalaska Bay and Akutan Bay when compared to historic catch at the same survey locations (Bon 2005).

The 2003 trawl survey estimated total abundance at 6.4 million crabs, the third largest abundance estimate since 1990. Population estimates for legal males, post-recruit males, and adult females were the highest on record (Spalinger 2004). A portion of the area was again surveyed by trawl gear in 2004. Total estimated abundance for the area surveyed was 5.2 million crabs. In Makushin/Skan Bays, legal male abundance estimates are the highest since the inception of the trawl survey and continued recruitment to the legal size class is likely in the next several years based on high numbers of pre-recruit sized crabs.

GROOVED TANNER CRAB

Historic Background

In a manner similar to other deep-water crab fisheries in the Aleutian Islands, the first harvest of grooved Tanner crabs *Chionoecetes tanneri* in the Eastern Aleutian District occurred in the early 1980s as incidental harvest in the Dutch Harbor golden king crab fishery. Directed fishing for *C. tanneri* did not begin until 1993, when one vessel participated from July until December. The grooved Tanner crab fishery in the Eastern Aleutian District typically occurred between March and December. Peak harvest in the Eastern Aleutian District occurred in 1995 when eight vessels landed approximately 883,000 pounds (Table 1-10).

Limited data has been collected regarding the abundance, distribution, and stock status of deep- water Tanner crab species in the Bering Sea and Aleutian Islands. During the 1993 season, the department reviewed data collected by onboard observers and restricted harvest to males of five inches or greater CW. In 1994, pursuant to permit provisions described in 5 AAC 35.511. PERMITS FOR TANNERI AND ANGULATUS TANNER CRAB IN REGISTRATION AREA J, the department required that vessels registered for this fishery carry an observer for all of their fishing activities. Data collected by observers has documented bycatch as well as fishing practices and has aided the department in developing further management measures.

In 1997, the department established GHLs for grooved Tanner crabs in the Eastern Aleutian, Bering Sea, and Alaska Peninsula Districts where most historical harvests had occurred. Harvest levels in this fishery were derived using catch information from previous seasons and data collected by onboard observers. A GHL of 200,000 pounds was established for each of the aforementioned areas, while smaller harvest levels of 100,000 pounds were established for the Kodiak and Western Aleutian Districts to allow for exploratory fishing. In addition, the department required that all pots be equipped with at least two escape rings of 4.5 inches minimum diameter (ADF&G 1999a).

2004 Fishery

No vessels registered to harvest grooved Tanner crabs in the Eastern Aleutian District during 2004.

Fishery Management and Stock Status

The grooved Tanner crab population in the Eastern Aleutian District is not surveyed; consequently, no estimates of population abundance are available for this stock. Fishery data from the mid 1990s is the primary source of information regarding abundance and stock status. Catch per unit of effort declined from 15 legal crabs per pot lift in 1993 to two in 1996 and catches decreased from over 850,000 pounds in 1995 to 106,000 pounds in 1996. In addition, fishing effort was concentrated in three statistical areas immediately to the south of Unalaska Island. This information indicates that at least in the area historically fished, the population was heavily exploited.

Given poor fishery performance and declining harvests of the mid 1990s, the department re-evaluated deepwater Tanner crab guideline harvest levels in 2000. A GHL range of 50,000 to 200,000 pounds was established for the Eastern Aleutian District. The GHL was set as a range to provide greater flexibility for inseason management and to better inform the public of the department’s management goals for the fishery. The fishery will be managed so that the upper end of the GHL range is reached only when catch rates similar to, or greater than those documented prior to the harvest declines of the mid 1990s are observed. In addition to new GHL requirements, the department specified that four 4.5-inch escape rings be placed on the lower third of each pot and required that pots be fished over multiple depth strata. Observers required on all vessels registered for the fishery will collect biological and fishery data.

TRIANGLE TANNER CRAB

Historic Background

In the Eastern Aleutian District, triangle Tanner crab *Chionoecetes angulatus* is harvested under a permit authorized in 5 AAC 35.511. PERMITS FOR TANNERI AND ANGULATUS TANNER CRAB IN REGISTRATION AREA J. Triangle Tanner crabs were incidentally harvested in the eastern Aleutian grooved Tanner crab fishery, where the species has occurred in small numbers. Prior to 1995 and the beginning of the directed fishery, no harvest of triangle Tanner crabs was reported on fish tickets; however, shellfish observers stationed on board vessels participating in the grooved Tanner crab fishery observed small numbers of triangle crabs harvested in 1994 (ADF&G 1999a). Two vessels targeted triangle Tanner crabs in the Eastern Aleutian District during the 1995 and 1996 seasons, thus harvest information from those fisheries is confidential (Table 1-11). From 1997 to 2000, no vessels registered to harvest triangle Tanner crabs in the Eastern Aleutian District.

2004 Fishery

No vessels registered to harvest triangle Tanner crabs in the Eastern Aleutian District during 2004.

Fishery Management and Stock Status

Surveys of population abundance are not conducted for triangle Tanner crabs; thus the status of this stock is unknown. Because of the paucity of population level data for this species and the history of the fishery, additional fishing for triangle Tanner crabs in the Eastern Aleutian District will be limited to incidental harvest during the grooved Tanner crab fishery. Vessels registered to fish for grooved Tanner crabs will be permitted to harvest triangle Tanner crabs at up to 50% of the weight of the target species. This harvest level is consistent with the historic development of the fishery.

WESTERN ALEUTIAN TANNER CRAB DISTRICT

DESCRIPTION OF AREA

The Western Aleutian Tanner crab District of Registration Area J includes all waters west of 172° W long., east of the United States-Russia Maritime Boundary Line of 1991, and south of 54° 36’ N lat. (Figure 1-9). Area J encompasses both waters of the Territorial Sea (0-3 nautical miles) and waters of the Exclusive Economic Zone (3-200 nautical miles).

TANNER CRAB

Historic Background

Harvest of Tanner crabs *Chionoecetes bairdi* from the Western Aleutian District has, in general, been incidental to the directed red king crab fishery in that area. Commercial harvest has ranged from a high of over 800,000 pounds during the 1981/82 season to less than 8,000 pounds in 1991/92 (Table 1-12). No commercial harvest of Tanner crabs has occurred in the Western Aleutian District since 1995/96. The Western Aleutian District Tanner crab fishery reached a maximum value of just over $1 million in the 1981/82 season (Table 1-13). Tanner crab abundance in the Western Aleutian District is probably limited by available habitat. Most of the historical harvest occurred within a few bays in the vicinity of Adak and Atka Islands.

2004/05 Fishery

The Western Aleutian District Tanner crab fishery has a regulatory opening date of November 1, however, the fishery was not opened during the 2004/05 season. The fishery was not opened because there is not sufficient population data to develop a GHL or to establish that a harvestable surplus exists.

Fishery Management and Stock Status

No stock assessment surveys are conducted for Tanner crabs in the Western Aleutian District; thus no population estimates are available. Stock status is currently unknown. Historic fisheries were managed using GHLs set from commercial catch data (ADF&G 1985).

GROOVED TANNER CRAB

Historic Background

In the Western Aleutian District, harvest of grooved Tanner crab first occurred as bycatch with the developing golden king crab fishery in the Adak king crab management area during the late 1970s. Effort in this fishery has been minimal with two or fewer vessels participating during most years. Only in 1995 did significant fishing effort occur, when six vessels harvested approximately 146,000 pounds of grooved Tanner crabs (Table 1-14).

To prevent overharvest of this population where little abundance information is available, the ADF&G restricted harvest to males of five inches or greater CW in 1993. In addition, beginning in 1994, and according to provisions provided in 5 AAC 35.511 PERMITS FOR TANNERI AND ANGULATUS TANNER CRAB IN AREA J, all vessels registered for the fishery were required to carry an onboard observer for all of their fishing activities. Using information collected by onboard observers and historic catch information, the department established GHLs for grooved Tanner crabs in the Western Aleutian District in 1997. The GHL was set at 100,000 pounds; this level was believed to be adequate to allow for exploratory fishing and incidental harvest (ADF&G 1999a). Since 1997, the department has reevaluated harvest levels for deepwater Tanner crabs. Because directed commercial fishing for grooved Tanner crabs in the Western Aleutian District has only occurred during four seasons and no survey data is available, confidence was not as high in the GHL for this district as in other districts where grooved Tanner crab harvest has occurred. In order to prevent overharvest of this stock, no GHL was set in 2000 when new deepwater Tanner crab GHLs were announced and the fishery will remain closed until further notice.

In addition to harvests of *C. bairdi* and grooved Tanner crab, fishers have anecdotally reported incidental triangle Tanner crab catch in the grooved Tanner crab and golden king crab fisheries in the Western Aleutian District. There have not been any landings of triangle Tanner crab from this area and there is currently no fishery.

2004 Fishery

The Western Aleutian District was not open to commercial fishing for grooved Tanner crabs in 2004.

Fishery Management and Stock Status

No stock assessment surveys have been conducted for grooved Tanner crabs in the Western Aleutian District; therefore, no estimates of population abundance are available. Fishery data from the mid 1990s indicates that the western Aleutian Islands may not support grooved Tanner crab populations as large as the eastern Aleutian Islands and the Bering Sea. Commercial fishery data from the mid 1990s indicates that neither catch nor CPUE were large when compared to those observed in other districts.

ALEUTIAN DISTRICT DUNGENESS CRAB

DESCRIPTION OF AREA

The Aleutian District for Dungeness crab *Cancer magister* management includes all waters of Registration Area J west of the longitude of Scotch Cap Light (164° 44' W long.), south of the latitude of Cape Sarichef (54° 36' N lat.), and east of the United States-Russia Maritime Boundary Line of 1991 (Figure 1-11). Area J encompasses both waters of the Territorial Sea (0-3 nautical miles) and waters of the Exclusive Economic Zone (3-200 nautical miles).

HISTORIC BACKGROUND

Islands in the Aleutian chain are separated by deep passes with swift currents and are closely bordered on the north by the Aleutian Basin and to the south by the Aleutian Trench. Dungeness crabs inhabit bays, estuaries, and other shallow water habitats, areas that are sparse and widely dispersed in the Aleutian Islands. Therefore, populations of Dungeness crabs are small and fishing effort has been low within the district.

The Aleutian District Dungeness crab fishery has occurred primarily as a small-vessel, summer fishery in the vicinity of Unalaska Island. Some larger-vessel effort has occurred in other locales within the district, but fishing in these areas has been sporadic throughout the history of the fishery. Interest and activity in this fishery has been erratic from year to year, with the first reliable reports of harvest made in 1970. Since 1974, harvests have ranged from no landings, to a peak of over 91,000 pounds in 1984/85 (Table 1-15). Four vessels operated that year, with over 80% of their catch coming from Unalaska and Makushin Bays. In addition to commercial harvest, Dungeness crabs have also been taken in subsistence and sport fisheries occurring in the vicinity of Unalaska Island. Subsistence harvest reports returned to ADF&G

between 1988 and 1994 indicate that Dungeness crab harvests were larger than those documented for both red king *P. camtschaticus* and Tanner crabs *C. bairdi*. On average, 15 harvest reports were returned per year and Dungeness harvest averaged 686 crabs per year with a range of five to 1,906 crabs per year (ADF&G 1999b). A harvest permit is not required for sport or subsistence caught Dungeness crab, therefore no harvest estimates are available, but annual catch is believed to be low.

2004/05 FISHERY

No vessels registered to harvest Dungeness crabs during the 2004/05 season.

FISHERY MANAGEMENT AND STOCK STATUS

The Aleutian Islands Dungeness crab fishery is managed using size, sex, and season restrictions. Only male Dungeness crabs six and one-half inches (165 mm) or greater in carapace width may be retained in the Aleutian District from 12:00 NOON May 1 to 12:00 NOON January 1. No stock assessment work has been performed and limited biological and fishery data have been collected through dockside sampling. The status of this species in the Aleutian Islands is unknown, but the resource is believed to be limited due to the lack of suitable habitat.

ALEUTIAN DISTRICT SHRIMP

DESCRIPTION OF AREA

The Aleutian District of Registration Area J, as described for shrimp, includes all Bering Sea and Pacific Ocean waters west of the longitude of Cape Sarichef at 164° 55' W long. and east of the United States-Russia Maritime Boundary Line of 1991 (Figure 1-12). Area J encompasses both waters of the Territorial Sea (0-3 nautical miles) and waters of the Exclusive Economic Zone (3-200 nautical miles). The Aleutian District includes four sections: Unalaska Bay, Makushin Bay, Usof Bay, and Beaver Inlet.

HISTORIC BACKGROUND

Commercial fishing for shrimp in the Aleutian District began in the 1960s with Russian and Japanese participation. Most harvests occurred northwest of the Pribilof Islands, with some harvests as large as 30,000 metric tons per year. In 1972 a domestic trawl fishery began targeting northern pink shrimp *Pandalus borealis* in the vicinity of Unalaska Island. Catch and effort increased and harvest peaked in 1977/78 at 6.8 million pounds (Table 1-16). Sharp declines in catches after 1978 led to a reduction in season length. Between 1983 and 1991 no fishing occurred; however, in 1992 four catcher-processors targeted shrimp northwest of the Pribilof Islands. Low concentrations of shrimp were located and all four vessels departed the fishery after making a total of six landings for 72,133 pounds. Since 1992, interest in fishing for shrimp in the Aleutian District has remained at a very low level, several vessels registered to fish, but made no landings. In 1999, the first commercial harvest of shrimp in the Aleutian District occurred since 1992. Only two vessels registered for the fishery; therefore, catch information is confidential. Initial catches were composed primarily of northern pink shrimp. As the fishery progressed, sidestriped shrimp *Pandalopsis dispar* became the dominant species in the catch. The fishery was closed on July 9, 1999, because ADF&G did not possess adequate information regarding the abundance and distribution of these species and it was not possible to prosecute the trawl fishery in accordance with 5 AAC 39.210. MANAGEMENT PLAN FOR HIGH IMPACT EMERGING FISHERIES.

2004 FISHERY

The 2004 trawl fishery did not open because there was insufficient information on shrimp stock abundance and distribution. There is no closed season for shrimp fishing with pots in the Aleutian Islands.

FISHERY MANAGEMENT AND STOCK STATUS

ADF&G has obtained limited population information for the shrimp stocks of the Aleutian Islands. The last extensive commercial activity occurred in the 1970s and trawl surveys conducted by ADF&G and NMFS do not target shrimp. Consequently, ADF&G does not possess information to develop a management plan or conduct a commercial trawl fishery. Fishers have expressed interest in collaborating with ADF&G on a stock assessment survey, but funding constraints have limited such endeavors. Once BOF has adopted a plan for new and developing fisheries, a collaborative survey may be one step in the creation of a sustainable, well-managed fishery. In 2000, NMFS performed a pilot deep-sea trawl survey of the continental slope. Sidestriped shrimp was the most abundant shrimp species, found primarily on the continental slope of the Bering Sea east of Zhemchug Canyon at an average depth of 214 fathoms. NMFS conducted an eastern Bering Sea continental slope survey again in 2002. Sidestriped and northern pink shrimp were the most abundance species encountered although extensive data was not collected (Hoff and Britt 2003). Shrimp are also encountered during the NMFS summer Bering Sea trawl survey. The most abundant species caught on the survey are northern pink shrimp which are found along the outer shelf between the 100 and 200 meter depth contours and humpy shrimp, *P. goniurus*, which are usually found in water shallower than 100 meters.

ALEUTIAN DISTRICT MISCELLANEOUS SHELLFISH SPECIES

DESCRIPTION OF AREA

The Aleutian Islands portion of miscellaneous shellfish Registration Area J, includes all waters south of the latitude of Cape Sarichef (54° 36' N lat.), west of the longitude of Scotch Cap Light (164° 44' W long.), and east of the United States-Russia Maritime Boundary Line of 1991 (Figure 1-13). Area J encompasses both waters of the Territorial Sea (0-3 nautical miles) and waters of the Exclusive Economic Zone (3-200 nautical miles). Area J is not divided into districts for commercial miscellaneous shellfish fisheries.

INTRODUCTION

Shellfish species included in this section are those which have been harvested in relatively small amounts compared to the commercial king and Tanner crab fisheries which occur in the Aleutian Islands. Miscellaneous shellfish species include hair crabs, sea urchins, sea cucumbers, snails, *Paralomis multispina* (cherry) crab, and octopi. It is ADF&Gs policy to register vessels for exploratory fishing in these new and emerging fisheries under authority of a commissioner's permit described in 5 AAC 38.062. PERMITS FOR OCTOPI, SQUID, HAIR CRAB, SEA URCHINS, SEA CUCUMBERS, SEA SNAILS, AND OTHER MARINE INVERTEBRATES. Typically, permit conditions were general and not fully developed on an individual species basis. Fisheries for these species were conducted without prior knowledge of stock abundance or distribution and no harvest limits were established.

2004 FISHERIES

Octopus

In 2004, directed fishing for octopi was permitted in the Aleutian Islands under the authority of a commissioner's permit. Twelve vessels registered for the fishery using pot gear. Two vessels fished during the early summer months and ten additional vessels registered to fish octopus in the fall. All vessels fishing octopus in the fall were concurrently registered for the Pacific cod pot fishery. These vessels were allowed to retain all octopus and cod captured in their pots provided they fished exclusively in state waters. Fishery CPUE was one octopus per pot and the average weight of gutted octopus was 39 pounds. One processor purchased octopus in the directed fishery, thus all harvest information is confidential.

Incidental harvest may also be retained on a Commercial Entry Fisheries Commission (CFEC) card at up to 20% of the weight of the target species. In 2004, out of the 132 vessels registered for incidental harvest, 72 vessels made 401 landings of octopus totaling 720,997 pounds from the Aleutian Islands (Table 1-17). At-sea discards totaled 97,463 pounds. The majority of retained octopuses were sold to processors (86%), while the rest was either retained for personal use including bait (13%), discarded (<1%) or sold for use as fishmeal (<1%). Octopus landings were made by vessels targeting Pacific cod or other groundfish species using pot gear (98%), longline gear (1%), trawl gear (<1%) and jig gear (<1%).

Sea Cucumber and Sea Urchin

In September of 2004, ADF&G issued a news release announcing the GHL for sea cucumbers and sea urchins in the Westward Region. The 2004 season opened under a commissioner's permit with a GHL of 5,000 pounds each of eviscerated product for sea cucumbers and whole animal weight for sea urchins in the Aleutian Islands. The small GHLs were established to permit conservative commercial exploration of areas that lacked historic harvest data and to allow ADF&G to collect critical information for future management purposes. However, no vessels or divers registered or fished for either of these fisheries in the Aleutian Islands in 2004.

Other Miscellaneous Shellfish Species

No vessels were registered for any other miscellaneous shellfish species in the Aleutian Islands in 2004.

FISHERY MANAGEMENT AND STOCK STATUS

No surveys of abundance for octopuses have been performed in the Aleutian Islands; thus, no population data is available. ADF&G has not developed a management plan for this species. In addition to incidental harvest which is limited to 20% of the weight of the target species, directed fishing may also occur under the authority of a commissioner's permit. A fishing logbook is required for the directed fishery and only pots or dive gear may be used. Starting in 2005, vessels may not be concurrently registered to fish more that one species in a directed fishery using pot gear. Stock assessment work has not been performed for other miscellaneous shellfish species in the Aleutian Islands and until such work has been performed and a BOF approved management plan has been adopted, only limited fisheries for these species will be allowed.

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Table 1-1.-Aleutian Islands, Area O, red king crab commercial fishery data, 1960/61 - 2004/05.

Season	Locale	Number of Vessels[a]	Number of Landings	Number of Crabs[b]	Number of Pots Lifted	Harvest[b,c]	Average Weight[c]	Average CPUE[d]	Average Length[e]	Deadloss[c]
1960/61	East of 172°	NA	NA	NA	NA	NA	NA	NA	NA	NA
	West of 172°	4	41	NA	NA	2,074,000	NA	NA	NA	NA
	TOTAL									
1961/62	East of 172°	4	69	NA	NA	533,000	NA	NA	NA	NA
	West of 172°	8	218	NA	NA	6,114,000	NA	NA	NA	NA
	TOTAL		**287**			**6,647,000**				
1962/63	East of 172°	6	102	NA	NA	1,536,000	NA	NA	NA	NA
	West of 172°	9	248	NA	NA	8,006,000	NA	NA	NA	NA
	TOTAL		**350**			**9,542,000**				
1963/64	East of 172°	4	242	NA	NA	3,893,000	NA	NA	NA	NA
	West of 172°	11	527	NA	NA	17,904,000	NA	NA	NA	NA
	TOTAL		**769**			**21,797,000**				
1964/65	East of 172°	12	336	NA	NA	13,761,000	NA	NA	NA	NA
	West of 172°	18	442	NA	NA	21,193,000	NA	NA	NA	NA
	TOTAL		**778**			**34,954,000**				
1965/66	East of 172°	21	555	NA	NA	19,196,000	NA	NA	NA	NA
	West of 172°	10	431	NA	NA	12,915,000	NA	NA	NA	NA
	TOTAL		**986**			**32,111,000**				
1966/67	East of 172°	27	893	NA	NA	32,852,000	NA	NA	NA	NA
	West of 172°	10	90	NA	NA	5,883,000	NA	NA	NA	NA
	TOTAL		**983**			**38,735,000**				

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Table 1-1.-(Page 2 of 6)

		Number of					Average			
Season	Locale	Vessels[a]	Landings	Crabs[b]	Pots Lifted	Harvest[b,c]	Weight[c]	CPUE[d]	Length[e]	Deadloss[c]
1967/68	East of 172°	34	747	NA	NA	22,709,000	NA	NA	NA	NA
	West of 172°	22	505	NA	NA	14,131,000	NA	NA	NA	NA
	TOTAL		**1,252**			**36,840,000**				
1968/69	East of 172°	NA	NA	NA	NA	11,300,000	NA	NA	NA	NA
	West of 172°	30	NA	NA	NA	16,100,000	NA	NA	NA	NA
	TOTAL					**27,400,000**				
1969/70	East of 172°	41	375	NA	72,683	8,950,000	NA	NA	NA	NA
	West of 172°	33	435	NA	115,929	18,016,000	6.5	NA	NA	NA
	TOTAL		**810**		**188,612**	**26,966,000**				
1970/71	East of 172°	32	268	NA	56,198	9,652,000	NA	NA	NA	NA
	West of 172°	35	378	NA	124,235	16,057,000	NA	NA	NA	NA
	TOTAL		**646**		**180,433**	**25,709,000**				
1971/72	East of 172°	32	210	1,447,692	31,531	9,391,615	7	46	NA	NA
	West of 172°	40	166	NA	46,011	15,475,940	NA	NA	NA	NA
	TOTAL		**376**		**77,542**	**24,867,555**				
1972/73	East of 172°	51	291	1,500,904	34,037	10,450,380	7	44		
	West of 172°	43	313	3,461,025	81,133	18,724,140	5.4	43	NA	NA
	TOTAL		**604**	**4,961,929**	**115,170**	**29,174,520**	**5.9**	**43**		
1973/74	East of 172°	56	290	1,780,673	41,840	12,722,660	7.1	43	NA	NA
	West of 172°	41	239	1,844,974	70,059	9,741,464	5.3	26	148.6	NA
	TOTAL		**529**	**3,625,647**	**111,899**	**22,464,124**	**6.2**	**32**		

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Table 1-1.-(Page 3 of 6)

Season	Locale	Number of Vessels[a]	Number of Landings	Number of Crabs[b]	Number of Pots Lifted	Harvest[b,c]	Average Weight[c]	Average CPUE[d]	Average Length[e]	Deadloss[c]
1974/75	East of 172°	87	372	1,812,647	71,821	13,991,190	7.7	25		
	West of 172°	36	97	532,298	32,620	2,774,963	5.2	16	148.6	NA
	TOTAL		**469**	**2,344,945**	**104,441**	**16,766,153**	**7.1**	**22**		
1975/76	East of 172°	79	369	2,147,350	86,874	15,906,660	7.4	25		
	West of 172°	20	25	79,977	8,331	411,583	5.2	10	147.2	NA
	TOTAL		**394**	**2,227,327**	**95,205**	**16,318,243**	**7.3**	**23**		
1976/77	East of 172°	72	226	1,273,298	65,796	9,367,965[f]	7.4	19		
	East of 172°	38	61	86,619	17,298	830,458[g]	9.6	5	NA	NA
	West of 172°				FISHERY CLOSED					
	TOTAL		**287**	**1,359,917**	**83,094**	**10,198,423**	**7.5**	**16**		
1977/78	East of 172°	33	227	539,656	46,617	3,658,860[f]	6.8	12		
	East of 172°	6	7	3,096	812	25,557[h]	8.3	4	NA	NA
	West of 172°	12	18	160,343	7,269	905,527	5.7	22	152.2	NA
	TOTAL		**252**	**703,095**	**54,698**	**4,589,944**	**6.5**	**13**		
1978/79	East of 172°	60	300	1,233,758	51,783	6,824,793	5.5	24	NA	NA
	West of 172°	13	27	149,491	13,948	807,195	5.4	11	NA	1,170
	TOTAL		**327**	**1,383,249**	**65,731**	**7,631,988**	**5.5**	**21**		
1979/80	East of 172°	104	542	2,551,116	120,554	15,010,840	5.9	21	NA	NA
	West of 172°	18	23	82,250	9,757	467,229	5.7	8	152	24,850
	TOTAL		**565**	**2,633,366**	**130,311**	**15,478,069**	**5.9**	**20**		
1980/81	East of 172°	114	830	2,772,287	231,607	17,660,620[f]	6.4	12	NA	NA
	East of 172°	54	120	182,349	30,000	1,392,923[h]	7.6	6		
	West of 172°	17	52	254,390	20,914	1,419,513	5.6	12	149	54,360
	TOTAL		**1,002**	**3,209,026**	**282,521**	**20,473,056**	**6.4**	**11**		

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Table 1-1.-(Page 4 of 6)

Season	Locale	Number of Vessels[a]	Number of Landings	Number of Crabs[b]	Number of Pots Lifted	Harvest[b,c]	Average Weight[c]	Average CPUE[d]	Average Length[e]	Deadloss[c]
1981/82	East of 172°	92	683	741,966	220,087	5,155,345	6.9	3	NA	NA
	West of 172°	46	106	291,311	40,697	1,648,926	5.7	7	148.3	8,759
	TOTAL		**789**	**1,033,277**	**260,784**	**6,804,271**	**6.6**	**4**		
1982/83	East of 172°	81	278	64,380	72,924	431,179	6.7	1		
	West of 172°	72	191	284,787	66,893	1,701,818	6.0	4	150.8	7,855
	TOTAL		**469**	**349,167**	**139,817**	**2,132,997**	**6.1**	**3**		
1983/84	East of 172°	FISHERY CLOSED								
	West of 172°	106	248	298,948	60,840	1,981,579	6.6	5	157.3	3,833
	TOTAL	**106**	**248**	**298,948**	**60,840**	**1,981,579**	**6.6**	**5**	**157.3**	**3,833**
1984/85	East of 171°	FISHERY CLOSED								
	West of 171°	64	113	206,751	50,685	1,367,672	6.6	4	155.1	0
	TOTAL	**64**	**113**	**206,751**	**50,685**	**1,367,672**	**6.6**	**4**	**155.1**	**0**
1985/86	East of 171°	FISHERY CLOSED								
	West of 171°	35	89	162,271	32,478	906,293	5.6	5	152.2	6,120
	TOTAL	**35**	**89**	**162,271**	**32,478**	**906,293**	**5.6**	**5**	**152.2**	**6,120**
1986/87	East of 171°	FISHERY CLOSED								
	West of 171°	33	69	126,146	29,189	712,243	5.6	4	NA	500
	TOTAL	**33**	**69**	**126,146**	**29,189**	**712,243**	**5.6**	**4**	**NA**	**501**
1987/88	East of 171°	FISHERY CLOSED								
	West of 171°	71	109	211,712	43,433	1,213,933	5.7	5	148.5	6,900
	TOTAL	**71**	**109**	**211,712**	**43,433**	**1,213,933**	**5.7**	**5**	**148.5**	**6,900**
1988/89	East of 171°	FISHERY CLOSED								
	West of 171°	73	156	266,053	64,374	1,567,314	5.9	4	153.1	557
	TOTAL	**73**	**156**	**266,053**	**64,374**	**1,567,314**	**5.9**	**4**	**153.1**	**557**

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Table 1-1.-(Page 5 of 6)

Season	Locale	Number of Vessels[a]	Landings	Crabs[b]	Pots Lifted	Harvest[b,c]	Average Weight[c]	CPUE[d]	Length[e]	Deadloss[c]
1989/90	East of 171°					FISHERY CLOSED				
	West of 171°	56	123	196,070	54,513	1,118,566	5.7	4	151.5	759
	TOTAL	**56**	**123**	**196,070**	**54,513**	**1,118,566**	**5.7**	**4**	**151.5**	**759**
1990/91	East of 171°					FISHERY CLOSED				
	West of 171°	7	34	146,903	10,674	828,105	5.6	14	148.1	0
	TOTAL	**7**	**34**	**146,903**	**10,674**	**828,105**	**5.6**	**14**	**148.1**	**0**
1991/92	East of 171°					FISHERY CLOSED				
	West of 171°	10	35	165,356	16,636	951,278	5.7	10	149.8	0
	TOTAL	**10**	**35**	**165,356**	**16,636**	**951,278**	**5.7**	**10**	**149.8**	**0**
1992/93	East of 171°					FISHERY CLOSED				
	West of 171°	12	30	218,049	16,129	1,286,424	6.0	13	151.5	5,000
	TOTAL	**12**	**30**	**218,049**	**16,129**	**1,286,424**	**6.0**	**13**	**151.5**	**5,000**
1993/94	East of 171°					FISHERY CLOSED				
	West of 171°	12	21	119,330	13,575	698,077	5.8	9	154.6	7,402
	TOTAL	**12**	**21**	**119,330**	**13,575**	**698,077**	**5.8**	**9**	**154.6**	**7,402**
1994/95	East of 171°					FISHERY CLOSED				
	West of 171°	20	31	30,337	18,146	196,967	6.5	2	157.5	1,430
	TOTAL	**20**	**31**	**30,337**	**18,146**	**196,967**	**6.5**	**2**	**157.5**	**1,430**
1995/96	East of 171°					FISHERY CLOSED				
	West of 171°	4	12	6,880	2,205	38,941	5.7	3	153.6	235
	TOTAL	**4**	**12**	**6,880**	**2,205**	**38,941**	**5.7**	**3**	**153.6**	**235**
1996/97						FISHERY CLOSED				
1997/98						FISHERY CLOSED				

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Table 1-1.-(Page 6 of 6)

Season	Locale	Number of Vessels[a]	Landings	Crabs[b]	Pots Lifted	Harvest[b,c]	Average Weight[c]	CPUE[d]	Length[e]	Deadloss[c]
1998/99	West of 174°	3	6	749	102	5,900	7.9	7	NA	0
1999/2000					FISHERY CLOSED					
2000/01[i]	Petrel Bank[j]	1	3	11,257	498	76,792	6.8	23	161.0	0
2001/02[k]	Petrel Bank[j]	4	5	22,080	700	153,961	7.0	32	159.5	82
2002/03	Petrel Bank[j]	33	35	68,300	3,782	505,642	7.4	18	162.4	1,311
2003/04	Petrel Bank[j]	30	31	59,828	5,774	479,113	8.0	10	167.9	2,617
2004/05					FISHERY CLOSED					

[a] Many vessels fished both east and west locales., thus total number of vessels reflects registrations for entire Aleutian Islands.
[b] Deadloss included.
[c] In pounds.
[d] Number of legal crabs per pot lift.
[e] Carapace length in millimeters.
[f] Split season based on 6.5 inch minimum legal size.
[g] Split season based on 8 inch minimum legal size.
[h] Split season based on 7.5 inch minimum legal size.
[I] January/February Petrel Bank survey (fish ticket harvest code 15).
[j] Those waters of king crab Registration Area O between 179° E long., 179° W long., and north of 51° 45' N lat.
[k] November Petrel Bank survey (fish ticket harvest code 15).
NA = Not available.

Table 1-1.-Aleutian Islands, Area O, red king crab commercial fishery data, 1960/61 - 2004/05.

		Number of					Average			
Season	Locale	Vessels[a]	Landings	Crabs[b]	Pots Lifted	Harvest[b,c]	Weight[c]	CPUE[d]	Length[e]	Deadloss[c]
1960/61	East of 172°	NA	NA	NA	NA	NA	NA	NA	NA	NA
	West of 172°	4	41	NA	NA	2,074,000	NA	NA	NA	NA
	TOTAL									
1961/62	East of 172°	4	69	NA	NA	533,000	NA	NA	NA	NA
	West of 172°	8	218	NA	NA	6,114,000	NA	NA	NA	NA
	TOTAL		**287**			**6,647,000**				
1962/63	East of 172°	6	102	NA	NA	1,536,000	NA	NA	NA	NA
	West of 172°	9	248	NA	NA	8,006,000	NA	NA	NA	NA
	TOTAL		**350**			**9,542,000**				
1963/64	East of 172°	4	242	NA	NA	3,893,000	NA	NA	NA	NA
	West of 172°	11	527	NA	NA	17,904,000	NA	NA	NA	NA
	TOTAL		**769**			**21,797,000**				
1964/65	East of 172°	12	336	NA	NA	13,761,000	NA	NA	NA	NA
	West of 172°	18	442	NA	NA	21,193,000	NA	NA	NA	NA
	TOTAL		**778**			**34,954,000**				
1965/66	East of 172°	21	555	NA	NA	19,196,000	NA	NA	NA	NA
	West of 172°	10	431	NA	NA	12,915,000	NA	NA	NA	NA
	TOTAL		**986**			**32,111,000**				
1966/67	East of 172°	27	893	NA	NA	32,852,000	NA	NA	NA	NA
	West of 172°	10	90	NA	NA	5,883,000	NA	NA	NA	NA
	TOTAL		**983**			**38,735,000**				

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Table 1-1.-(Page 2 of 6)

		Number of					Average			
Season	Locale	Vessels[a]	Landings	Crabs[b]	Pots Lifted	Harvest[b,c]	Weight[c]	CPUE[d]	Length[e]	Deadloss[c]
1967/68	East of 172°	34	747	NA	NA	22,709,000	NA	NA	NA	NA
	West of 172°	22	505	NA	NA	14,131,000	NA	NA	NA	NA
	TOTAL		**1,252**			**36,840,000**				
1968/69	East of 172°	NA	NA	NA	NA	11,300,000	NA	NA	NA	NA
	West of 172°	30	NA	NA	NA	16,100,000	NA	NA	NA	NA
	TOTAL					**27,400,000**				
1969/70	East of 172°	41	375	NA	72,683	8,950,000	NA	NA	NA	NA
	West of 172°	33	435	NA	115,929	18,016,000	6.5	NA	NA	NA
	TOTAL		**810**		**188,612**	**26,966,000**				
1970/71	East of 172°	32	268	NA	56,198	9,652,000	NA	NA	NA	NA
	West of 172°	35	378	NA	124,235	16,057,000	NA	NA	NA	NA
	TOTAL		**646**		**180,433**	**25,709,000**				
1971/72	East of 172°	32	210	1,447,692	31,531	9,391,615	7	46	NA	NA
	West of 172°	40	166	NA	46,011	15,475,940	NA	NA	NA	NA
	TOTAL		**376**		**77,542**	**24,867,555**				
1972/73	East of 172°	51	291	1,500,904	34,037	10,450,380	7	44		
	West of 172°	43	313	3,461,025	81,133	18,724,140	5.4	43	NA	NA
	TOTAL		**604**	**4,961,929**	**115,170**	**29,174,520**	**5.9**	**43**		
1973/74	East of 172°	56	290	1,780,673	41,840	12,722,660	7.1	43	NA	NA
	West of 172°	41	239	1,844,974	70,059	9,741,464	5.3	26	148.6	NA
	TOTAL		**529**	**3,625,647**	**111,899**	**22,464,124**	**6.2**	**32**		

-continued-

Table 1-1.-(Page 3 of 6)

Season	Locale	Number of Vessels[a]	Landings	Crabs[b]	Pots Lifted	Harvest[b,c]	Average Weight[c]	CPUE[d]	Length[e]	Deadloss[c]
1974/75	East of 172°	87	372	1,812,647	71,821	13,991,190	7.7	25		
	West of 172°	36	97	532,298	32,620	2,774,963	5.2	16	148.6	NA
	TOTAL		**469**	**2,344,945**	**104,441**	**16,766,153**	**7.1**	**22**		
1975/76	East of 172°	79	369	2,147,350	86,874	15,906,660	7.4	25		
	West of 172°	20	25	79,977	8,331	411,583	5.2	10	147.2	NA
	TOTAL		**394**	**2,227,327**	**95,205**	**16,318,243**	**7.3**	**23**		
1976/77	East of 172°	72	226	1,273,298	65,796	9,367,965[f]	7.4	19		
	East of 172°	38	61	86,619	17,298	830,458[g]	9.6	5	NA	NA
	West of 172°				FISHERY CLOSED					
	TOTAL		**287**	**1,359,917**	**83,094**	**10,198,423**	**7.5**	**16**		
1977/78	East of 172°	33	227	539,656	46,617	3,658,860[f]	6.8	12		
	East of 172°	6	7	3,096	812	25,557[h]	8.3	4	NA	NA
	West of 172°	12	18	160,343	7,269	905,527	5.7	22	152.2	NA
	TOTAL		**252**	**703,095**	**54,698**	**4,589,944**	**6.5**	**13**		
1978/79	East of 172°	60	300	1,233,758	51,783	6,824,793	5.5	24	NA	NA
	West of 172°	13	27	149,491	13,948	807,195	5.4	11	NA	1,170
	TOTAL		**327**	**1,383,249**	**65,731**	**7,631,988**	**5.5**	**21**		
1979/80	East of 172°	104	542	2,551,116	120,554	15,010,840	5.9	21	NA	NA
	West of 172°	18	23	82,250	9,757	467,229	5.7	8	152	24,850
	TOTAL		**565**	**2,633,366**	**130,311**	**15,478,069**	**5.9**	**20**		
1980/81	East of 172°	114	830	2,772,287	231,607	17,660,620[f]	6.4	12	NA	NA
	East of 172°	54	120	182,349	30,000	1,392,923[h]	7.6	6		
	West of 172°	17	52	254,390	20,914	1,419,513	5.6	12	149	54,360
	TOTAL		**1,002**	**3,209,026**	**282,521**	**20,473,056**	**6.4**	**11**		

-continued-

Table 1-1.-(Page 4 of 6)

Season	Locale	Number of				Harvest[b,c]	Average			Deadloss[c]
		Vessels[a]	Landings	Crabs[b]	Pots Lifted		Weight[c]	CPUE[d]	Length[e]	
1981/82	East of 172°	92	683	741,966	220,087	5,155,345	6.9	3	NA	NA
	West of 172°	46	106	291,311	40,697	1,648,926	5.7	7	148.3	8,759
	TOTAL		**789**	**1,033,277**	**260,784**	**6,804,271**	**6.6**	**4**		
1982/83	East of 172°	81	278	64,380	72,924	431,179	6.7	1		
	West of 172°	72	191	284,787	66,893	1,701,818	6.0	4	150.8	7,855
	TOTAL		**469**	**349,167**	**139,817**	**2,132,997**	**6.1**	**3**		
1983/84	East of 172°					FISHERY CLOSED				
	West of 172°	106	248	298,948	60,840	1,981,579	6.6	5	157.3	3,833
	TOTAL	**106**	**248**	**298,948**	**60,840**	**1,981,579**	**6.6**	**5**	**157.3**	**3,833**
1984/85	East of 171°					FISHERY CLOSED				
	West of 171°	64	113	206,751	50,685	1,367,672	6.6	4	155.1	0
	TOTAL	**64**	**113**	**206,751**	**50,685**	**1,367,672**	**6.6**	**4**	**155.1**	**0**
1985/86	East of 171°					FISHERY CLOSED				
	West of 171°	35	89	162,271	32,478	906,293	5.6	5	152.2	6,120
	TOTAL	**35**	**89**	**162,271**	**32,478**	**906,293**	**5.6**	**5**	**152.2**	**6,120**
1986/87	East of 171°					FISHERY CLOSED				
	West of 171°	33	69	126,146	29,189	712,243	5.6	4	NA	500
	TOTAL	**33**	**69**	**126,146**	**29,189**	**712,243**	**5.6**	**4**	**NA**	**501**
1987/88	East of 171°					FISHERY CLOSED				
	West of 171°	71	109	211,712	43,433	1,213,933	5.7	5	148.5	6,900
	TOTAL	**71**	**109**	**211,712**	**43,433**	**1,213,933**	**5.7**	**5**	**148.5**	**6,900**
1988/89	East of 171°					FISHERY CLOSED				
	West of 171°	73	156	266,053	64,374	1,567,314	5.9	4	153.1	557
	TOTAL	**73**	**156**	**266,053**	**64,374**	**1,567,314**	**5.9**	**4**	**153.1**	**557**

-continued-

Table 1-1.-(Page 5 of 6)

Season	Locale	Number of Vessels[a]	Number of Landings	Number of Crabs[b]	Number of Pots Lifted	Harvest[b,c]	Average Weight[c]	Average CPUE[d]	Average Length[e]	Deadloss[c]
1989/90	East of 171°	FISHERY CLOSED								
	West of 171°	56	123	196,070	54,513	1,118,566	5.7	4	151.5	759
	TOTAL	**56**	**123**	**196,070**	**54,513**	**1,118,566**	**5.7**	**4**	**151.5**	**759**
1990/91	East of 171°	FISHERY CLOSED								
	West of 171°	7	34	146,903	10,674	828,105	5.6	14	148.1	0
	TOTAL	**7**	**34**	**146,903**	**10,674**	**828,105**	**5.6**	**14**	**148.1**	**0**
1991/92	East of 171°	FISHERY CLOSED								
	West of 171°	10	35	165,356	16,636	951,278	5.7	10	149.8	0
	TOTAL	**10**	**35**	**165,356**	**16,636**	**951,278**	**5.7**	**10**	**149.8**	**0**
1992/93	East of 171°	FISHERY CLOSED								
	West of 171°	12	30	218,049	16,129	1,286,424	6.0	13	151.5	5,000
	TOTAL	**12**	**30**	**218,049**	**16,129**	**1,286,424**	**6.0**	**13**	**151.5**	**5,000**
1993/94	East of 171°	FISHERY CLOSED								
	West of 171°	12	21	119,330	13,575	698,077	5.8	9	154.6	7,402
	TOTAL	**12**	**21**	**119,330**	**13,575**	**698,077**	**5.8**	**9**	**154.6**	**7,402**
1994/95	East of 171°	FISHERY CLOSED								
	West of 171°	20	31	30,337	18,146	196,967	6.5	2	157.5	1,430
	TOTAL	**20**	**31**	**30,337**	**18,146**	**196,967**	**6.5**	**2**	**157.5**	**1,430**
1995/96	East of 171°	FISHERY CLOSED								
	West of 171°	4	12	6,880	2,205	38,941	5.7	3	153.6	235
	TOTAL	**4**	**12**	**6,880**	**2,205**	**38,941**	**5.7**	**3**	**153.6**	**235**
1996/97		FISHERY CLOSED								
1997/98		FISHERY CLOSED								

-continued-

Table 1-1.-(Page 6 of 6)

		Number of					Average			
Season	Locale	Vessels[a]	Landings	Crabs[b]	Pots Lifted	Harvest[b,c]	Weight[c]	CPUE[d]	Length[e]	Deadloss[c]
1998/99	West of 174°	3	6	749	102	5,900	7.9	7	NA	0
1999/2000	FISHERY CLOSED									
2000/01[i]	Petrel Bank[j]	1	3	11,257	498	76,792	6.8	23	161.0	0
2001/02[k]	Petrel Bank[j]	4	5	22,080	700	153,961	7.0	32	159.5	82
2002/03	Petrel Bank[j]	33	35	68,300	3,782	505,642	7.4	18	162.4	1,311
2003/04	Petrel Bank[j]	30	31	59,828	5,774	479,113	8.0	10	167.9	2,617
2004/05	FISHERY CLOSED									

[a] Many vessels fished both east and west locales., thus total number of vessels reflects registrations for entire Aleutian Islands.
[b] Deadloss included.
[c] In pounds.
[d] Number of legal crabs per pot lift.
[e] Carapace length in millimeters.
[f] Split season based on 6.5 inch minimum legal size.
[g] Split season based on 8 inch minimum legal size.
[h] Split season based on 7.5 inch minimum legal size.
[I] January/February Petrel Bank survey (fish ticket harvest code 15).
[j] Those waters of king crab Registration Area O between 179° E long., 179° W long., and north of 51° 45' N lat.
[k] November Petrel Bank survey (fish ticket harvest code 15).
NA = Not available.

Table 1-2.-Aleutian Islands, Area O, red king crab fishery economic performance data, 1973/74 - 2004/05.

			Value		Season Length	
Year	Locale	GHL[a]	Ex-vessel[b]	Total	Days	Dates
1973/74	East of 172° W long.	10.0[c]	$0.65	$8,269,729	24	11/01 - 11/24
	West of 172° W long.	20.0[c]	NA	NA	NA	11/01 - 12/06
1974/75	East of 172° W long.	11.5[c]	$0.37	$5,176,740	75	11/01 - 01/14
	West of 172° W long.	20.0[c]	$0.35	$971,237	NA	11/01 - 02/26
1975/76	East of 172° W long.	14.5[c]	$0.42	$6,680,797	71	11/01 - 01/10
	West of 172° W long.	15.0[c]	$0.38	$156,402	NA	01/10 - 12/18
1976/77	East of 172° W long.[d]	14.5[c]	$0.64	$5,995,497	37	11/01 - 12/07
	East of 172° W long.[e]		$0.79	$656,061	31	12/13 - 01/13
	West of 172° W long.			FISHERY CLOSED		
1977/78	East of 172° W long.[d]	8.0 - 14.5[c]	$0.99	$3,622,271	84	09/15 - 12/08
	East of 172° W long.[f]		$1.35	$34,502	28	12/08 - 01/05
	West of 172° W long.	0.25 - 2.5[g]	$1.36	$1,231,517	NA	NA
1978/79	East of 172° W long.	5.0 - 13.0[c]	$1.35	$9,213,471	71	09/10 - 11/20
	West of 172° W long.	0.5 - 3.0[g]	$1.23	$992,850	NA	NA
1979/80	East of 172° W long.	17.0 - 25.0[c]	$0.90	$13,509,756	122	09/10 - 01/10
	West of 172° W long.	0.5 - 3.0[g]	$0.68	$317,716	NA	NA
1980/81	East of 172° W long.[d]	7.0 - 17.0[c]	$1.02	$18,013,832	73	11/01 - 01/12
	East of 172° W long.[f]		$1.03	$1,434,711	31	01/15 - 02/15
	West of 172° W long.	0.5 - 3.0[g]	$0.92	$1,305,952	72	01/15 - 03/28
1981/82	East of 172° W long.	7.0 - 17.0[c]	$2.30	$11,617,293	107	11/01 - 02/15
	West of 172° W long.	0.5 - 3.0[g]	$2.01	$3,314,341	107	11/01 - 02/15
1982/83	East of 172° W long.	2.0 - 3.0[h]	$3.43	$1,478,944	66	11/01 - 01/15
	West of 172° W long.	0.5 - 3.0[g]	$3.44	$5,854,254	76	11/01 - 01/15
1983/84	East of 172° W long.			FISHERY CLOSED		
	West of 172° W long.	0.5 - 3.0[g]	$3.43	$6,796,816	340	01/01 - 12/16

-continued-

Table 1-2.-(page 2 of 3)

Year	Locale	GHL[a]	Value		Season Length	
			Ex-vessel[b]	Total	Days	Dates
1984/85	East of 171° W long.			FISHERY CLOSED		
	West of 171° W long.	1.5 - 3.0[i]	$2.10	$2,872,111	97	11/10 - 02/15
1985/86	East of 171° W long.			FISHERY CLOSED		
	West of 171° W long.	0.5 - 2.0[i]	$2.15	$1,948,530	107	11/01 - 02/15
1986/87	East of 171° W long.			FISHERY CLOSED		
	West of 171° W long.	0.5 - 1.5[i]	$3.87	$2,756,380	107	11/01 - 02/15
1987/88	East of 171° W long.			FISHERY CLOSED		
	West of 171° W long.	0.5 - 1.5[i]	$4.00	$4,855,732	107	11/01 - 02/15
1988/89	East of 171° W long.			FISHERY CLOSED		
	West of 171° W long.	1.0[i]	$5.00	$7,836,570	34	11/01 - 12/04
1989/90	East of 171° W long.			FISHERY CLOSED		
	West of 171° W long.	1.7[i]	$4.20	$4,697,977	107	11/01 - 02/15
1990/91	East of 171° W long.			FISHERY CLOSED		
	West of 171° W long.	NA	$4.00	$3,312,420	107	11/01 - 02/15
1991/92	East of 171° W long.			FISHERY CLOSED		
	West of 171° W long.	NA	$3.00	$2,853,834	107	11/01 - 02/15
1992/93	East of 171° W long.			FISHERY CLOSED		
	West of 171° W long.	NA	$5.05	$6,496,441	76	11/01 - 01/15
1993/94	East of 171° W long.			FISHERY CLOSED		
	West of 171° W long.	NA	$3.87	$2,701,558	107	11/01 - 02/15
1994/95	East of 171° W long.			FISHERY CLOSED		
	West of 171° W long.	1.0 - 1.5	$5.50	$1,083,319	27	11/01 - 11/28
1995/96	East of 171° W long.			FISHERY CLOSED		
	West of 171° W long.	1.0 - 1.5	$2.81	$109,424	107	11/01 - 02/15
1996/97 - 1997/98				FISHERY CLOSED		

-continued-

Table 1-2.-(page 3 of 3)

Year	Locale	GHL[a]	Value		Season Length	
			Ex-vessel[b]	Total	Days	Dates
1998/99	West of 174° W long.	0.015	CONFIDENTIAL			
1999/2000 - 2001/02			FISHERY CLOSED			
2002/03	Petrel Bank[j]	0.5	$6.51	$3,291,729	2	10/25 - 10/27
2003/04	Petrel Bank[j]	0.5	$5.14	$2,449,189	4	10/25 - 10/29
2004/05			FISHERY CLOSED			

[a] Guideline harvest level (GHL), millions of pounds.

[b] Average price per pound. No economic data available prior to 1973.

[c] GHL includes all king crab species. Golden king crab primarily harvested incidental to red king crab.

[d] Split season based on 6.5 inch minimum legal size.

[e] Split season based on 8.0 inch minimum legal size.

[f] Split season based on 7.5 inch minimum legal size.

[g] Red king crab only.

[h] The harvest strategy was to take 40% of the estimated population of legal size male king crab. No survey was conducted in Area O in 1982, and a preseason harvest estimate of 2 - 3 millions pounds was based on the 1981 survey and fishery.

[i] GHL includes red and blue king crab.

[j] Those waters of king crab Registration Area O between 179° E long., 179° W long., and north of 51° 45' N lat.

NA = Not available.

Confidential = Less than three vessels or processors participated in fishery.

Table 1-3.-Eastern Aleutian Islands, west of Scotch Cap Light and east of 168° W long., subsistence king and Tanner crab harvest, 1999-2004.

Year	Number of Permits Issued	Number of Permits Returned	Percentage Returned	Harvest[a]			
				King crab reported	King crab estimated	Tanner crab reported	Tanner crab estimated
1999	180	80	44.4	787	1,771	1,432	3,222
2000	194	143	73.7	523	710	911	1,236
2001	201	153	76.1	1,128	1,482	1,703	2,237
2002	237	177	74.7	1,080	1,446	2,453	3,285
2003	231	160	69.3	387	559	4,600	6,641
2004[b]	225	144	64.0	201	314	4,417	6,902
2000 - 2004 Average	**218**	**155**	**71.4**	**664**	**902**	**2,817**	**4,060**

[a] Harvest estimate, in numbers of crab, from Unalaska Island (no reported harvest from any other portion of permit area).

[b] Data incomplete, permits are returned throughout the year.

Table 1-4.-Aleutian Islands golden king crab commercial fishery data, 1981/82 - 2004/05.

Season	Locale	Number of			Harvest[b,c]	Number of Pots		Average			Deadloss[c]
		Vessels[a]	Landings	Crabs[b]		Registered	Lifted	Weight[c]	CPUE[d]	Length[e]	
1981/82	East of 172° W.	6	16	22,666	115,715	0	2,906	5.1	8	158	8,752
	West of 172° W.	14	76	217,700	1,194,046	2,647	24,627	5.5	9	160	22,064
	TOTAL		**92**	**240,458**	**1,319,761**	**2,647**	**27,533**	**5.4**	**9**		**30,816**
1982/83	East of 172° W.	49	136	227,471	1,184,971	NA	29,369	5.2	8	158	47,479
	West of 172° W.	99	501	1,509,001	8,006,274	13,111	150,103	5.3	10	158	220,743
	TOTAL		**637**	**1,737,109**	**9,191,245**	**13,111**	**179,472**	**5.3**	**10**		**268,222**
1983/84	East of 172° W.	47	132	238,353	1,810,973	4,514	29,595	7.6	8	NA	45,268
	West of 172° W.	157	1,002	1,534,909	8,128,029	17,406	226,798	5.3	7	NA	171,021
	TOTAL		**1,134**	**1,773,262**	**9,939,002**	**21,920**	**256,393**	**5.6**	**7**		**186,289**
1984/85	East of 171° W.	13	67	327,440	1,521,142	1,394	24,044	4.6	14	161	70,362
	West of 171° W.	38	85	643,597	3,180,095	5,270	64,777	4.9	10	157	125,073
	TOTAL		**152**	**971,274**	**4,701,237**	**6,664**	**88,821**	**4.8**	**11**		**195,435**
1985/86	East of 171° W.	13	67	410,977	1,968,213	1,479	34,287	4.7	12	156	38,663
	West of 171° W.	49	386	2,052,048	11,124,759	7,057	202,401	5.4	10	151	5,304
	TOTAL		**453**	**2,463,025**	**13,092,972**	**8,536**	**236,688**	**5.3**	**10**		**43,967**
1986/87	East of 171° W.	17	71	400,389	1,869,180	1,575	37,585	4.7	11	NA	9,510
	West of 171° W.	62	525	2,923,947	12,798,004	12,958	392,185	4.4	7	150	276,736
	TOTAL		**596**	**3,324,336**	**14,667,184**	**14,533**	**429,770**	**4.4**	**8**		**286,246**
1987/88	East of 171° W.	22	77	299,734	1,383,198	3,591	43,017	4.6	7	150	24,210
	West of 171° W.	46	386	1,908,989	8,001,177	10,687	267,705	4.2	7	147	165,415
	TOTAL		**463**	**2,208,723**	**9,324,375**	**14,278**	**310,722**	**4.2**	**7**		**189,625**

-continued-

Table 1-4.-(Page 2 of 4)

Season	Locale	Number of Vessels[a]	Number of Landings	Number of Crabs[b]	Harvest[b,c]	Number of Pots Registered	Number of Pots Lifted	Average Weight[c]	Average CPUE[d]	Average Length[e]	Deadloss[c]
1988/89	East of 171° W.	21	57	323,695	1,545,113	4,215	40,869	4.8	8	154	22,960
	West of 171° W.	74	455	2,165,508	9,080,196	23,627	280,732	4.2	8	149	122,251
	TOTAL		**512**	**2,489,203**	**10,625,309**	**27,842**	**321,604**	**4.3**	**8**		**145,211**
1989/90	East of 171° W.	13	70	424,067	1,852,249	5,635	43,345	4.4	10	151	17,421
	West of 171° W.	64	505	2,520,786	10,162,400	14,724	324,153	4.0	8	149	100,724
	TOTAL		**575**	**2,944,853**	**12,014,649**	**20,359**	**367,498**	**4.1**	**8**		**118,145**
1990/91	East of 171° W.	16	58	384,885	1,718,848	5,225	54,618	4.3	7	148	42,800
	West of 171° W.	13	167	1,312,116	5,250,687	7,380	160,960	4.0	8	145	176,583
	TOTAL	**24**	**235**	**1,697,001**	**6,969,535**	**12,605**	**214,578**	**4.1**	**8**		**219,383**
1991/92	East of 171° W.	11	50	335,647	1,447,732	3,760	40,604	4.3	8	148	45,100
	West of 171° W.	16	206	1,511,751	6,254,409	7,635	192,949	4.1	8	145	96,848
	TOTAL	**20**	**256**	**1,847,398**	**7,702,141**	**11,395**	**233,553**	**4.2**	**8**		**141,948**
1992/93	East of 171° W.	10	44	330,159	1,375,048	4,222	37,718	4.1	9	148	37,200
	West of 171° W.	18	130	1,198,169	4,916,149	8,236	165,503	4.1	7	147	104,215
	TOTAL	**22**	**174**	**1,528,328**	**6,291,197**	**12,458**	**203,221**	**4.1**	**8**		**141,415**
1993/94	East of 171° W.	4	14	217,788	915,460	2,334	22,490	4.2	10	149	7,324
	West of 171° W.	21	147	1,102,541	4,635,683	11,970	212,164	4.2	5	148	165,358
	TOTAL	**21**	**161**	**1,320,329**	**5,551,143**	**14,304**	**234,654**	**4.2**	**6**		**172,682**
1994/95	East of 171° W.	14	45	384,353	1,750,267	7,378	67,537	4.6	6	148	29,908
	West of 171° W.	34	247	1,539,866	6,378,030	15,604	319,006	4.1	5	150	242,065
	TOTAL	**35**	**292**	**1,924,219**	**8,128,297**	**22,982**	**386,543**	**4.2**	**5**		**271,973**

-continued-

Table 1-4.-(Page 3 of 4)

Season	Locale	Number of Vessels[a]	Number of Landings	Number of Crabs[b]	Harvest[b,c]	Number of Pots Registered	Number of Pots Lifted	Average Weight[c]	Average CPUE[d]	Average Length[e]	Deadloss[c]
1995/96	East of 171° W.	17	42	431,867	1,993,980	10,325	65,030	4.6	7	150	14,676
	West of 171° W.	25	139	1,134,274	4,896,926	14,213	226,463	4.2	5	147	338,223
	TOTAL	**28**	**181**	**1,566,141**	**6,890,906**	**24,538**	**291,493**	**4.4**	**5**		**352,899**
1996/97	East of 174° W.	14	70	725,452	3,262,516	9,040	113,460	4.5	6		156,857
	West of 174° W.	13	100	618,498	2,591,720	8,805	100,340	4.2	6		78,973
	TOTAL	**18**	**170**	**1,343,950**	**5,854,236**	**17,845**	**213,800**	**4.4**	**6**	**147**	**235,830**
1997/98	East of 174° W.	15	74	780,609	3,501,054	9,720	106,403	4.5	7	147	131,480
	West of 174° W.	8	160	569,550	2,444,628	5,240	86,811	4.3	7	148	79,525
	TOTAL	**15**	**234**	**1,350,159**	**5,945,682**	**14,960**	**193,214**	**4.4**	**7**	**147**	**211,005**
1998/99	East of 174° W.	14	55	740,011	3,247,863	8,295	83,378	4.4	9	148	82,113
	West of 174° W.	3	44	409,531	1,691,385	1,930	35,920	4.1	11	146	21,218
	TOTAL	**16**	**99**	**1,149,542**	**4,939,248**	**10,225**	**119,298**	**4.3**	**10**	**147**	**103,331**
1999/00	East of 174° W.	15	60	709,332	3,069,886	9,514	79,129	4.3	9	147	67,574
	West of 174° W.	17	113	676,558	2,768,902	10,564	101,040	4.1	7	147	104,675
	TOTAL	**17**	**173**	**1,385,890**	**5,838,788**	**20,078**	**180,169**	**4.2**	**8**	**147**	**172,249**
2000/01	East of 174° W.	15	50	704,702	3,134,079	10,598	71,551	4.5	10	147	55,999
	West of 174° W.	12	100	705,613	2,884,682	8,910	101,239	4.1	7	145	53,158
	TOTAL	**17**	**150**	**1,410,315**	**6,018,761**	**19,508**	**172,790**	**4.3**	**8**	**146**	**109,157**
2001/02	East of 174° W.	19	45	730,030	3,178,652	12,927	62,639	4.4	12	147	50,030
	West of 174° W.	9	90	686,738	2,740,054	8,491	105,512	4.0	7	145	43,519
	TOTAL	**21**	**134**	**1,416,768**	**5,918,706**	**21,418**	**168,151**	**4.2**	**8**	**146**	**93,549**

-continued-

Table 1-4.-(Page 4 of 4)

Season	Locale	Number of Vessels[a]	Number of Landings	Number of Crabs[b]	Harvest[b,c]	Number of Pots Registered	Number of Pots Lifted	Average Weight[c]	Average CPUE[d]	Average Length[e]	Deadloss[c]
2002/03	East of 174° W.	19	43	643,886	2,821,851	11,834	52,042	4.4	12	148	55,425
	West of 174° W.	6	72	664,832	2,640,604	6,225	78,979	4.0	8	146	32,101
	TOTAL	**22**	**115**	**1,308,718**	**5,462,455**	**18,059**	**131,021**	**4.2**	**10**	**147**	**87,526**
2003/04	East of 174° W.	18	37	643,074	2,977,055	12,518	58,883	4.6	11	149	76,006
	West of 174° W.	6	60	676,633	2,688,773	7,140	66,236	4.0	10	146	49,321
	TOTAL	**21**	**96**	**1,319,707**	**5,665,828**	**19,658**	**125,119**	**4.3**	**11**	**147**	**301,111**
2004/05	East of 174° W.	19	32	637,536	2,886,817	13,165	34,848	4.5	18	148	43,576
	West of 174° W.	6	51	685,465	2,688,234	7,240	56,846	3.9	12	146	43,560
	TOTAL	**22**	**83**	**1,323,001**	**5,575,051**	**20,405**	**91,694**	**4.2**	**14**	**147**	**87,136**

[a] Many vessels fished both east and west locales, thus total number of vessels reflects registrations for entire Aleutian Islands.

[b] Deadloss included.

[c] In pounds.

[d] Number of legal crabs per pot lift.

[e] Carapace length in millimeters, from observer database.

Table 1-5.-Aleutian Islands golden king crab fishery economic performance data, 1981/82 - 2004/05.

			Value		Season Length	
Year	Locale	GHL[a]	Ex-vessel[b]	Total[c]	Days	Dates
1981/82	East of 172° W.	7.0 - 17.0[d]	$2.05	$0.22	75	11/01-01/15
	West of 172° W.	NA	$2.06	$2.41	227	11/01-06/15
	Total	-	**$2.06**	**$2.63**		
1982/83	East of 172° W.	NA	$3.00	$3.41	105	11/01-02/15
	West of 172° W.	NA	$3.01	$23.43	166	11/01-04/15
	Total		**$3.01**	**$26.85**		
1983/84	East of 172° W.	NA	$3.05	$5.38	105	11/01-02/15
	West of 172° W.		$2.92	$23.23	157	11/10-04/15
	Total		**$2.94**	**$28.62**		
1984/85	East of 171° W.	NA	$1.35	$1.96	229	07/01-02/15
	West of 171° W.		$2.00	$6.11	240	11/10-07/08
	Total		**$1.79**	**$8.07**		
1985/86	East of 171° W.	NA	$2.00	$3.86	121	07/01-10/31
	West of 171° W.		$2.50	$27.80	288	11/01-08/15
	Total		**$2.43**	**$31.66**		
1986/87	East of 171° W.	NA	$2.85	$5.30	182	07/01-12/31
	West of 171° W.		$3.00	$37.56	288	11/01-08/15
	Total		**$2.98**	**$42.86**		
1987/88	East of 171° W.	NA	$2.85	$3.87	62	07/01-09/02
	West of 171° W.		$3.00	$23.51	289	11/01-08/15
	Total		**$2.98**	**$27.38**		
1988/89	East of 171° W.	NA	$3.00	$4.57	93	09/01-12/04
	West of 171° W.		$3.20	$28.66	288	11/01-08/15
	Total		**$3.17**	**$33.23**		
1989/90	East of 171° W.	NA	$3.50	$6.42	104	09/01-12/15
	West of 171° W.		$3.00	$30.18	288	11/01-08/15
	Total		**$3.08**	**$36.61**		
1990/91	East of 171° W.	NA	$3.00	$5.03	68	09/01-11/09
	West of 171° W.		$3.00	$15.22	288	11/01-08/15
	Total		**$3.00**	**$20.25**		
1991/92	East of 171° W.	NA	$2.00	$2.81	74	09/01-11/15
	West of 171° W.		$2.50	$15.39	289	11/01-08/15
	Total		**$2.41**	**$18.20**		
1992/93	East of 171° W.	NA	$2.50	$3.30	76	09/01-11/17
	West of 171° W.		$2.05	$9.86	288	11/01-08/15
	Total		**$2.15**	**$13.16**		
1993/94	East of 171° W.	NA	$2.15	$1.95	212	09/01-03/1
	West of 171° W.		$2.50	$11.18	288	11/01-08/15
	Total		**$2.44**	**$13.13**		

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Table 1-5.-(Page 2 of 2)

Year		GHL[a]	Value		Season Length	
			Ex-vessel[b]	Total[c]	Days	Dates
1994/95	East of 171° W.	NA	$4.00	$6.88	57	09/01-10/28
	West of 171° W.		$3.33	$20.43	288	11/01-08/15
	Total		**$3.48**	**$27.31**		
1995/96	East of 171° W.	1.5	$2.60	$5.15	38	09/01-10/09
	West of 171° W.	5.0 - 6.0	$2.10	$9.57	289	11/01-08/15
	Total	-	**$2.25**	**$14.72**		
1996/97	East of 174° W.	3.2	$2.23	$6.93	115	09/01-12/25
	West of 174° W.	2.7	$2.23	$5.60	365	09/01-08/31
	Total	**5.9**	**$2.23**	**$12.53**		
1997/98	East of 174° W.	3.2	$2.25	$7.58	84	09/01-11/24
	West of 174° W.	2.7	$2.10	$4.96	365	09/01-08/31
	Total	**5.9**	**$2.19**	**$12.54**		
1998/99	East of 174° W.	3.0	$1.87	$5.92	68	09/01-11/07
	West of 174° W.	2.7	$2.04	$3.41	365	09/01-08/31
	Total	**5.7**	**$1.92**	**$9.33**		
1999/00	East of 174° W.	3.0	$3.26	$9.78	55	09/01-10/25
	West of 174° W.	2.7	$3.09	$8.23	348	09/01-8/14
	Total	**5.7**	**$3.15**	**$18.01**		
2000/01	East of 174° W.	3.0	$3.50	$10.77	40	08/15-09/24
	West of 174° W.	2.7	$3.09	$8.75	286	08/15-05/28
	Total	**5.7**	**$3.33**	**$19.52**		
2001/02	East of 174° W.	3.0	$3.30	$10.26	26	08/15-09/10
	West of 174° W.	2.7	$2.93	$7.87	227	08/15-03/30
	Total	**5.7**	**$3.16**	**$18.13**		
2002/03	East of 174° W.	3.0	$3.30	$9.13	23	08/15-09/07
	West of 174° W.	2.7	$3.50	$9.13	205	08/15-03/08
	Total	**5.7**	**$3.38**	**$18.26**		
2003/04	East of 174° W.	3.0	$3.46	$10.05	24	08/15-09/08
	West of 174° W.	2.7	$3.83	$10.11	175	08/15-02/06
	Total	**5.7**	**$3.61**	**$20.16**		
2004/05	East of 174° W.	3.0	$3.18	$9.05	14	8/15-8/29
	West of 174° W.	2.7	$3.09	$8.16	141	8/15-1/03
	Total	**5.7**	**$3.14**	**$17.23**		

[a] Guideline harvest level, millions of pounds. Prior to 1996/97, management was based on size, sex, and season.

[b] Average price per pound.

[c] Millions of dollars.

[d] GHL includes all king crab species.

Table 1-6.-Aleutian Islands golden king crab catch by statistical area, 2004/05.

Locale	Statistical Area	Number of Landings	Number of Crab[a]	Number of Pots lifted	Harvest[a,b]	Average Weight[b]	Average CPUE[c]	Deadloss[b]
Yunaska Island	705200	6	87,762	4423	405,341	4.6	20	12,029
	705232	13	140,975	6,324	644,735	4.6	22	5,792
	705300	6	41,281	1930	185,649	4.5	21	1,864
Amukta Pass	715202	4	54,792	2,407	243,672	4.4	23	4,192
	715231	6	58,316	2,554	244,582	4.2	23	2,877
Seguam Pass	725201	10	86,690	4,768	391,654	4.5	18	4,813
Seguam Island	725203	4	10,382	486	46,615	4.5	21	716
Seguam Pass	725230	5	12,776	811	57,890	4.5	16	984
Kasatochi/Koniuji Islands	755201	5	2,969	565	12,523	4.2	5	290
Adak Island	765144	5	2,132	325	8,913	4.2	7	169
	765205	5	1,492	360	6,121	4.1	4	131
Kanaga/Tanaga Islands	775133	9	4,999	946	20,666	4.1	5	397
Bobrof Island	775137	8	3,538	746	14,442	4.1	5	279
Tanaga Island	785132	10	3,057	394	11,601	3.8	8	186
Amchitka Pass	795132	17	26,668	1,470	100,036	3.8	18	870
Other[d]		448	785,172	63,185	3,180,611	4.1	12	51,547
Total		**83**	**1,323,001**	**91,694**	**5,575,051**			**87,136**

[a] Deadloss included.

[b] In pounds.

[c] Number of legal crabs per pot lift.

[d] Combination of 83 statistical areas in which landings were made by fewer than three vessels.

Table 1-7.-Aleutian Islands scarlet king crab fishery data, 1992-2004.

		Number of					Average		Value		
Year	Area	Vessels	Landings	Crabs[a]	Pots lifted	Harvest[a,b]	Weight[b]	CPUE[c]	Ex-vessel[d]	Total[e]	Deadloss[b]
1992	Dutch Harbor					NO LANDINGS					
	Adak	1				CONFIDENTIAL					
1993	Dutch Harbor					NO LANDINGS					
	Adak					NO LANDINGS					
1994	Dutch Harbor	1				CONFIDENTIAL					
	Adak	5	9	6,613	7,370	21,269	3.2	1	$1.24	$26.4	10,829
	Total	6				CONFIDENTIAL					
1995	Dutch Harbor	3	7	6,270	5,706	13,871	2.2	1	$3.01	$41.8	1,755
	Adak	6	18	19,544	15,046	49,126	2.5	1	$2.95	$144.9	2,066
	Total	8	21	25,814	20,752	62,997	2.4	1	$1.89	$186.7	3,821
1996	Dutch Harbor	3	10	10,124	8,247	20,839	2.1	1	$1.78	$37.1	4,002
	Adak	4	13	10,199	18,547	24,161	2.4	<1	$1.80	$43.5	1,861
	Total	7	23	20,323	29,417	45,000	2.2	<1	$1.79	$80.6	5,851
1997	Aleutian Islands	3	12	2,698	21,217	6,720	2.5	1	$1.40	$9.4	408
1998	Aleutian Islands	2				CONFIDENTIAL					
1999	Aleutian Islands	1				CONFIDENTIAL					
2000	Aleutian Islands	2				CONFIDENTIAL					
2001	Aleutian Islands	2				CONFIDENTIAL					
2002	Aleutian Islands	2				CONFIDENTIAL					
2003	Aleutian Islands	2				CONFIDENTIAL					
2004	Aleutian Islands	2				CONFIDENTIAL					

[a] Deadloss included.

[b] In pounds.

[c] Number of legal crabs per pot lift.

[d] Average price per pound.

[e] Thousands of dollars.

Confidential = Less than three vessels or processors participated in fishery.

Table 1-8.-Eastern Aleutian District Tanner crab fishery data, 1973/74 - 2004.

Season	Locale	Number of Vessels	Number of Landings	Number of Crabs	Number of Pots lifted	GHL	Harvest[a,b]	Average Weight[b]	Average CPUE[c]	Deadloss[b]
1973/74		6	14	210,539	NA	NA	498,836	2.4	60	0
1974/75						CONFIDENTIAL				
1975/76		8	13	219,166	4,646	NA	534,295	2.4	47	0
1976/77		12	35	544,755	9,640	NA	1,239,569	2.3	57	0
1977/78		15	198	1,104,631	29,855	NA	2,494,631	2.3	37	0
1978/79		20	174	542,081	18,618	NA	1,280,115	2.4	29	0
1979/80		18	107	352,819	18,040	NA	886,487	2.5	20	NA
1981		29	119	264,238	21,771	NA	654,514	2.5	12	NA
1982		31	138	332,260	30,109	NA	739,694	2.2	11	NA
1983		23	107	250,774	22,168	NA	547,830	2.2	11	NA
1984		16	91	104,761	11,069	NA	239,585	2.3	9	NA
1985		7	56	78,930	6,295	NA	181,407	2.3	13	60
1986		8	37	73,187	10,244	NA	167,339	2.3	7	400
1987		8	65	72,098	5,915	NA	162,097	2.2	12	115
1988		20	130	129,478	11,011	NA	309,918	2.4	12	2,000
1989		12	108	144,593	14,615	NA	326,196	2.3	10	2,300
1990		10	75	68,859	6,858	NA	155,648	2.3	10	0
1991		5	27	21,511	1,849	NA	50,038	2.3	12	0
1992		4	29	42,096	2,963	NA	98,703	2.3	14	0
1993		7	34	51,441	3,530	NA	118,609	2.3	15	0
1994		8	119	71,760	6,303	NA	166,080	2.3	11	40
1995-2002						FISHERY CLOSED				
2003[d]		3	10	6,695	191		15,138	2.3	35	9
2004	Unalaska Bay	10	36	*	*	47,219	*	2.3	*	*
	Makushin/Skan	9	14	*	*	87,891	*	2.3	*	*
	Total	**14**	**50**	*****	*****	**135,110**	*****	**2.3**	*****	*****

[a] Deadloss included beginning 1985.

[b] In pounds.

[c] Number of legal crabs per pot lift.

[d] January/February survey (fish ticket harvest code 15).

NA = Not Available.

*Confidential = Less than three vessels or processors participated in fishery.

Table 1 9.-Eastern Aleutian District Tanner crab fishery economic performance data, 1973/74 - 2004.

	Date		Value	
Season	Opened	Closed	Exvessel[a]	Total[b]
1973/74	1-Oct	31-Jul	NA	
1974/75	18-Jan	15-Oct	NA	
1975/76	20-Jan	15-Oct	$0.20	$0.11
1976/77	7-Nov	15-Jun	$0.30	$0.38
1977/78	1-Nov	15-Jun	$0.38	$0.95
1978/79	1-Nov	15-Jun	$0.52	$0.67
1979/80	1-Nov	15-Jun	$0.52	$0.46
1981	15-Jan	15-Jun	$0.58	$0.38
1982	15-Feb	15-Jun	$1.25	$0.92
1983	15-Feb	15-Jun	$1.20	$0.66
1984	15-Feb	15-Jun	$0.98	$0.23
1985	15-Jan	15-Jun	$0.96	$0.17
1986	15-Jan	15-Jun	$1.66	$0.28
1987	15-Jan	15-Jun	$2.03	$0.33
1988	15-Jan	10-Apr	$2.18	$0.67
1989	15-Jan	7-May	$2.72	$0.88
1990	15-Jan	9-Apr	$1.97	$0.31
1991	15-Jan	31-Mar	$1.25	$0.06
1992	15-Jan	31-Mar	$2.07	$0.20
1993	15-Jan	31-Mar	$1.70	$0.20
1994	15-Jan	31-Mar	$2.11	$0.35
1995-2003	FISHERY CLOSED			
2004	15-Jan	3-Feb	CONFIDENTIAL	

[a] Average price per pound.
[b] Millions of dollars.
NA = Not Available.
Confidential = Less than three vessels or processors participated in fishery.

Table 1-10.-Eastern Aleutian District grooved Tanner crab fishery data, 1993 - 2004.

	Number of					Average		Value		
Year	Vessels	Landings	Crabs[a]	Pots lifted	Harvest[a,b]	Weight[b]	CPUE[c]	Exvessel[d]	Total[e]	Deadloss[b]
1993	1				CONFIDENTIAL					
1994	4	28	443,125	38,323	773,083	1.7	12	$1.72	$1.3	19,474
1995	8	55	512,655	78,400	882,667	1.7	7	$1.57	$1.4	30,373
1996	3	25	57,394	24,862	108,953	1.9	2	$0.99	$0.1	8,003
1997-2000					NO LANDINGS					
2001	1				CONFIDENTIAL					
2002 - 2004					NO LANDINGS					

[a] Deadloss included.
[b] In pounds.
[c] Number of legal crabs per pot lift.
[d] Average price per pound.
[e] Millions of dollars.
Confidential = Less than three vessels or processors participated in fishery.

Table 1-11.-Eastern Aleutian District triangle Tanner crab fishery data, 1993 - 2004.

	Number of					Average		Value		
Year	Vessels	Landings	Crabs[a]	Pots lifted	Harvest[a,b]	Weight[b]	CPUE[c]	Exvessel[d]	Total[e]	Deadloss[b]
1993					NO LANDINGS					
1994					NO LANDINGS					
1995	2				CONFIDENTIAL					
1996	2				CONFIDENTIAL					
1997-2000					NO LANDINGS					
2001	1				CONFIDENTIAL					
2002 - 2004					NO LANDINGS					

[a] Deadloss included.

[b] In pounds.

[c] Number of legal crabs per pot lift.

[d] Average price per pound.

[e] Millions of dollars.

Confidential = Less than three vessels or processors participated in fishery.

Table 1-12.-Western Aleutian District Tanner crab fishery data, 1973/74 - 2004/05.

	Number of					Average		
Year	Vessels	Landings	Crabs[a]	Pots lifted	Harvest[a,b]	Weight[b]	CPUE[c]	Deadloss[b]
1973/74	7	12	31,079	2,390	71,887	2.3	13	NA
1974/75				CONFIDENTIAL				
1975/76				CONFIDENTIAL				
1976/77				NO LANDINGS				
1977/78	6	7	103,190	2,700	237,512	2.3	38	NA
1978/79	6	9	84,129	4,730	197,244	2.3	18	0
1979/80	10	12	147,843	5,952	337,297	2.3	25	NA
1980/81	9	23	95,102	7,327	220,716	2.3	13	0
1981/82	17	43	364,164	21,910	838,697	2.3	17	6,470
1982/83	61	125	225,491	40,450	488,399	2.2	6	7,662
1983/84	31	86	171,576	20,739	384,146	2.2	8	200
1984/85	31	41	75,009	13,416	163,460	2.2	6	1,000
1985/86	15	30	98,089	7,999	206,814	2.1	12	0
1986/87	8	24	19,874	10,878	42,761	2.1	2	200
1987/88	15	37	63,545	7,453	141,390	2.2	9	200
1988/89	36	77	69,280	18,906	148,997	2.1	4	233
1989/90	12	30	22,937	6,204	48,746	2.1	4	3,810
1990/91	5	21	6,901	1,309	14,779	2.1	5	125
1991/92	8	8	3,483	986	7,825	2.2	4	NA
1992/93	2			CONFIDENTIAL				
1993/94				NO LANDINGS				
1994/95				NO LANDINGS				
1995/96	1			CONFIDENTIAL				
1996/97 - 2004/05				FISHERY CLOSED				

[a] Deadloss included.

[b] In pounds.

[c] Number of legal crabs per pot lift.

NA = Not available.

Confidential = Less than three vessels or processors participated in fishery.

Table 1-13.-Western Aleutian District commercial Tanner crab fishery economic data, 1973/74 - 2004/05.

Year	Value	
	Exvessel[a]	Total
1973/74	NOT AVAILABLE	
1974/75	CONFIDENTIAL	
1975/76	CONFIDENTIAL	
1976/77	NO LANDINGS	
1977/78	$0.38	$90,255
1978/79	$0.53	$104,539
1979/80	$0.52	$175,394
1980/81	$0.54	$119,187
1981/82	$1.30	$1,081,895
1982/83	$1.27	$610,536
1983/84	$0.95	$364,749
1984/85	$1.30	$211,198
1985/86	$1.40	$289,540
1986/87	$1.50	$63,842
1987/88	$2.10	$296,499
1988/89	$1.00	$148,764
1989/90	$1.00	$44,936
1990/91	$1.25	$18,318
1991/92	$1.00	$7,825
1992/93	CONFIDENTIAL	
1993/94	NO LANDINGS	
1994/95	NO LANDINGS	
1995/96	CONFIDENTIAL	
1996/97 - 2004/05	FISHERY CLOSED	

[a] Average price per pound.

Confidential = Less than three vessels or processors participated in fishery.

Table 1-14.-Western Aleutian District grooved Tanner crab fishery data, 1992 - 2004.

	Number of			Average		Value		
Year	Vessels	Pots lifted	Harvest[a,b]	Weight[b]	CPUE[c]	Exvessel[d]	Total[e]	Deadloss[b]
1992	1			CONFIDENTIAL				
1993				NO LANDINGS				
1994	2			CONFIDENTIAL				
1995	6	17,749	145,795	1.9	4	$2.45	$0.36	17,190
1996	1			CONFIDENTIAL				
1997-1998				NO LANDINGS				
1999-2004				FISHERY CLOSED				

[a] Deadloss included.

[b] In pounds.

[c] Number of legal crabs per pot lift.

[d] Average price per pound.

[e] Millions of dollars.

Confidential = Less than three vessels or processors participated in fishery.

Table 1-15.-Aleutian District Dungeness crab fishery data, 1974 - 2004/05.

	Season	Number of					Average		
Year	Dates	Vessels	Landings	Crabs[a]	Pots Lifted	Harvest[a,b]	Weight[b]	CPUE[c]	Price/pound
1974	01/01-12/31	3	13	24,459	3,399	60,517	2.4	8	NA
1975	01/01-12/31					CONFIDENTIAL			
1976/77	05/01-01/01					NO LANDINGS			
1977/78	05/01-01/01					NO LANDINGS			
1978/79	05/01-01/01					CONFIDENTIAL			
1979/80	05/01-01/01					CONFIDENTIAL			
1980/81	05/01-01/01					NO LANDINGS			
1981/82	05/01-01/01					NO LANDINGS			
1982/83	05/01-01/01					CONFIDENTIAL			
1983/84	05/01-01/01					CONFIDENTIAL			
1984/85	05/01-01/01	4	50	40,128	13,555	91,739	2.3	3	$1.35
1985/86	05/01-01/01	4	19	8,590	1,706	17,830	2.1	5	NA
1986/87	05/01-01/01	2				CONFIDENTIAL			
1987/88	05/01-01/01	5	43	13,247	2,987	26,627	2.0	4	$0.95
1988/89	05/01-01/01	6	45	10,814	2,581	22,634	2.1	4	$0.90
1989/90	05/01-01/01	4	31	5,165	2,078	11,124	2.1	2	$0.90
1990/91	05/01-01/01	3	11	8,379	1,345	17,365	2.1	6	$0.90
1991/92	05/01-01/01	4	14	3,654	732	7,412	2.0	5	$1.25
1992/93	05/01-01/01	4	13	2,854	555	5,649	2.0	5	$0.83
1993/4	05/01-01/01	5	12	3,448	797	7,531	2.2	4	$0.78
1994/95-2000/01	05/01-01/01					NO LANDINGS			
2001/02	05/01-01/01	1				CONFIDENTIAL			
2002/03	05/01-01/01	1				CONFIDENTIAL			
2003/04	05/01-01/01					NO LANDINGS			
2004/05	05/01-01/01					NO LANDINGS			

[a] Deadloss included.

[b] In pounds.

[c] Number of legal crabs per pot lift.

NA = Not available.

Confidential = Less than three vessels or processors participated in fishery.

Table 1-16.-Aleutian Islands District trawl shrimp fishery data, 1972 - 2004.

		Number of				Value	
Year	Season Dates	Vessels	Landings	Tows	Harvest[a]	Exvessel[b]	Total[c]
1972	1/1 - 12/1				CONFIDENTIAL		
1973	1/1 - 12/1				CONFIDENTIAL		
1974	1/1 - 12/1	7	88	721	5,749,407	NA	NA
1975	1/1 - 12/1	4	14	54	467,196	NA	NA
1976	1/1 - 12/1	8	66	689	3,670,609	$0.07	$0.26
1977/78	2/1 - 3/1	7	93	1,372	6,800,393	$0.12	$0.82
1978/79	4/1 - 3/1	7	74	1,007	4,946,350	$0.15	$0.74
1979/80	4/1 - 2/1	7	68	799	3,292,049	$0.20	$0.66
1980	3/1 - 12/1	4	60	711	2,454,829	$0.23	$0.56
1981	3/1 - 12/2	6	45	551	2,185,326	$0.22	$0.48
1982	5/1 - 6/1				CONFIDENTIAL		
1983-1991					NO LANDINGS		
1992	1/1 - 12/1	4	6	94	72,133	NA	NA
1993-1998					NO LANDINGS		
1999	1/1 - 7/9	2			CONFIDENTIAL		
2000-2004					FISHERY CLOSED		

[a] In pounds.

[b] Average price per pound.

[c] Millions of dollars.

NA = Not available.

Confidential = Less than three vessels or processors participated in fishery.

Table 1-17.-Aleutian Islands miscellaneous shellfish fishery data 1996 - 2004.

Year	Fishery	Number of Vessels	Number of Landings	Harvest[a]
1996	Octopus	35	119	62,214
	Sea Urchins	6	15[b]	3,701
	Sea Cucumbers	NO LANDINGS		
	Hair Crab	NO LANDINGS		
	Snails	NO LANDINGS		
	Paralomis multispina	NO LANDINGS		
1997	Octopus[c]	38	107	73,472
	Sea Urchins	NO LANDINGS		
	Sea Cucumbers	NO LANDINGS		
	Hair Crab	NO LANDINGS		
	Snails	NO LANDINGS		
	Paralomis multispina			
1998	Octopus	CONFIDENTIAL		
	Octopus[c]	24	75	29,360
	Sea Urchins	NO LANDINGS		
	Sea Cucumbers	NO LANDINGS		
	Hair Crab	NO LANDINGS		
	Snails	NO LANDINGS		
	Paralomis multispina	NO LANDINGS		
1999	Octopus[c]	34	95	115,322
	Sea Urchins	NO LANDINGS		
	Sea Cucumbers	NO LANDINGS		
	Hair Crab	NO LANDINGS		
	Snails	NO LANDINGS		
	Paralomis multispina	NO LANDINGS		
2000	Octopus[c]	31	91	21,265
	Sea Urchins	NO LANDINGS		
	Sea Cucumbers	NO LANDINGS		
	Hair Crab	NO LANDINGS		
	Snails	NO LANDINGS		
	Paralomis multispina	NO LANDINGS		
2001	Octopus[c]	25	51	13,097
	Sea Urchins	NO LANDINGS		
	Sea Cucumbers	NO LANDINGS		
	Hair Crab	NO LANDINGS		
	Snails	NO LANDINGS		
	Paralomis multispina	NO LANDINGS		

-continued-

Table 1-17.-(Page 2 of 2)

Year	Fishery	Number of Vessels	Number of Landings	Harvest[a]
2002	Octopus[c]	56	186	96,585
	Sea Urchins	NO LANDINGS		
	Sea Cucumbers	NO LANDINGS		
	Hair Crab	NO LANDINGS		
	Snails	NO LANDINGS		
	Paralomis multispina	NO LANDINGS		
2003	Octopus[c]	70	313	242,946
	Sea Urchins	NO LANDINGS		
	Sea Cucumbers	NO LANDINGS		
	Hair Crab	NO LANDINGS		
	Snails	NO LANDINGS		
	Paralomis multispina	NO LANDINGS		
2004	Octopus[c]	72	401	720,997
	Octopus, state-waters[d]	14	31	Confidential
	Total	**86**	**432**	
	Sea Urchins	NO LANDINGS		
	Sea Cucumbers	NO LANDINGS		
	Hair Crab	NO LANDINGS		
	Snails	NO LANDINGS		
	Paralomis multispina	NO LANDINGS		

[a] In pounds. Deadloss included.
[b] Dives.
[c] Octopus bycatch.
[d] Commissioner's permit fishery.
Confidential = Less than three vessels or processors participated in fishery.

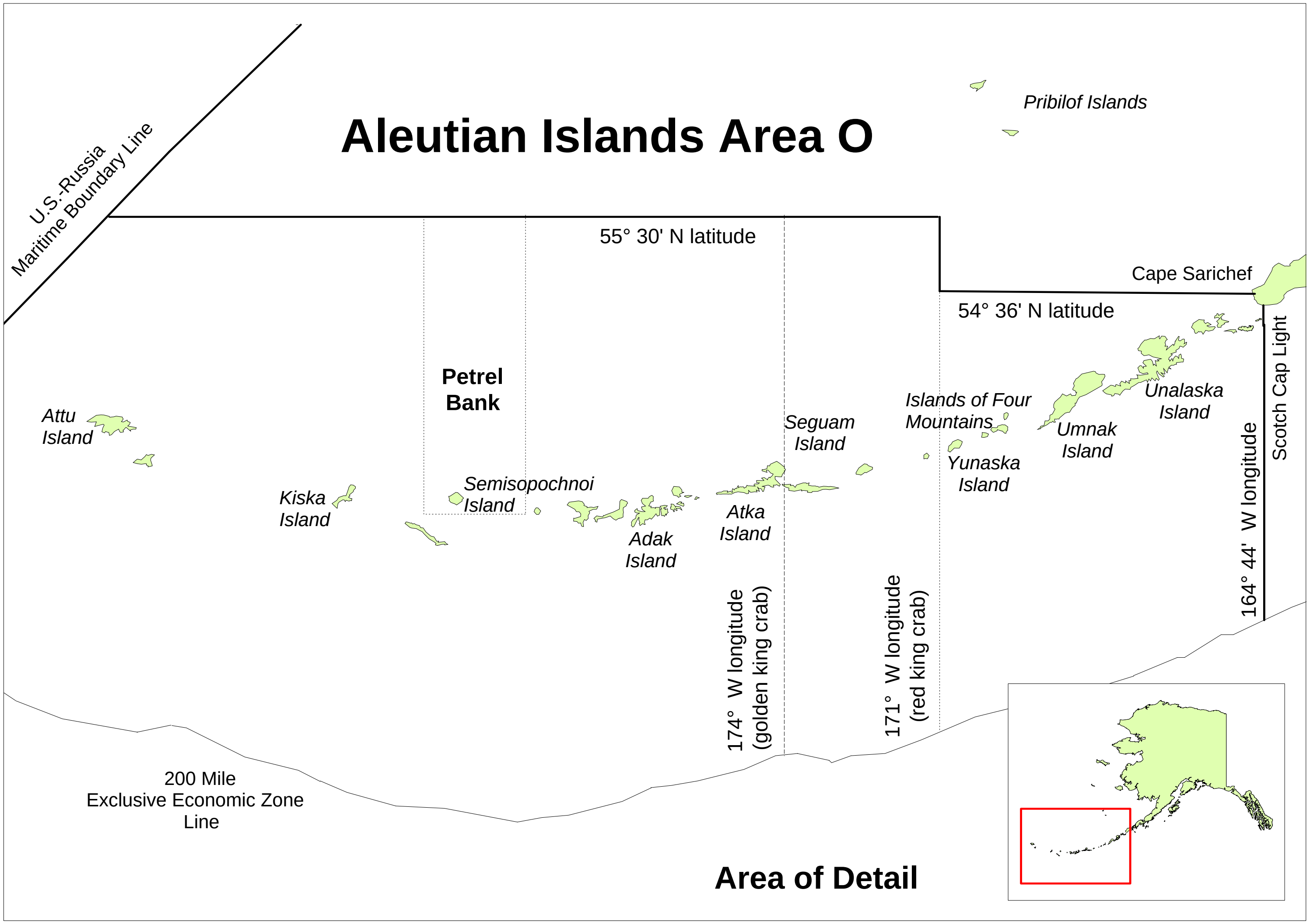

Figure 1-1.-Aleutian Islands, Area O, king crab management area.

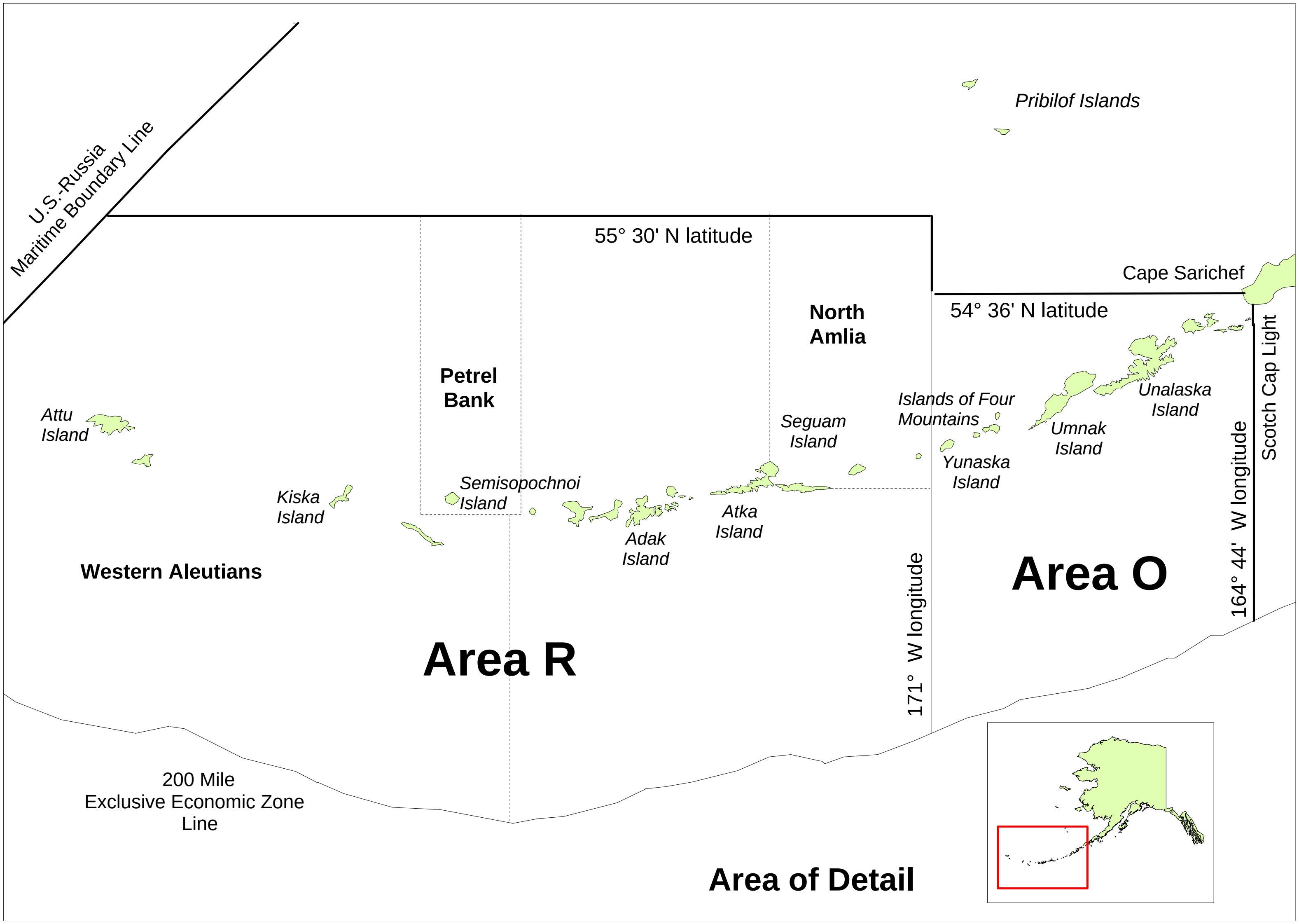

Figure 1-2.-Adak (Area R) and Dutch Harbor (Area O) king crab Registration Areas and Districts 1981/82 – 1996/97.

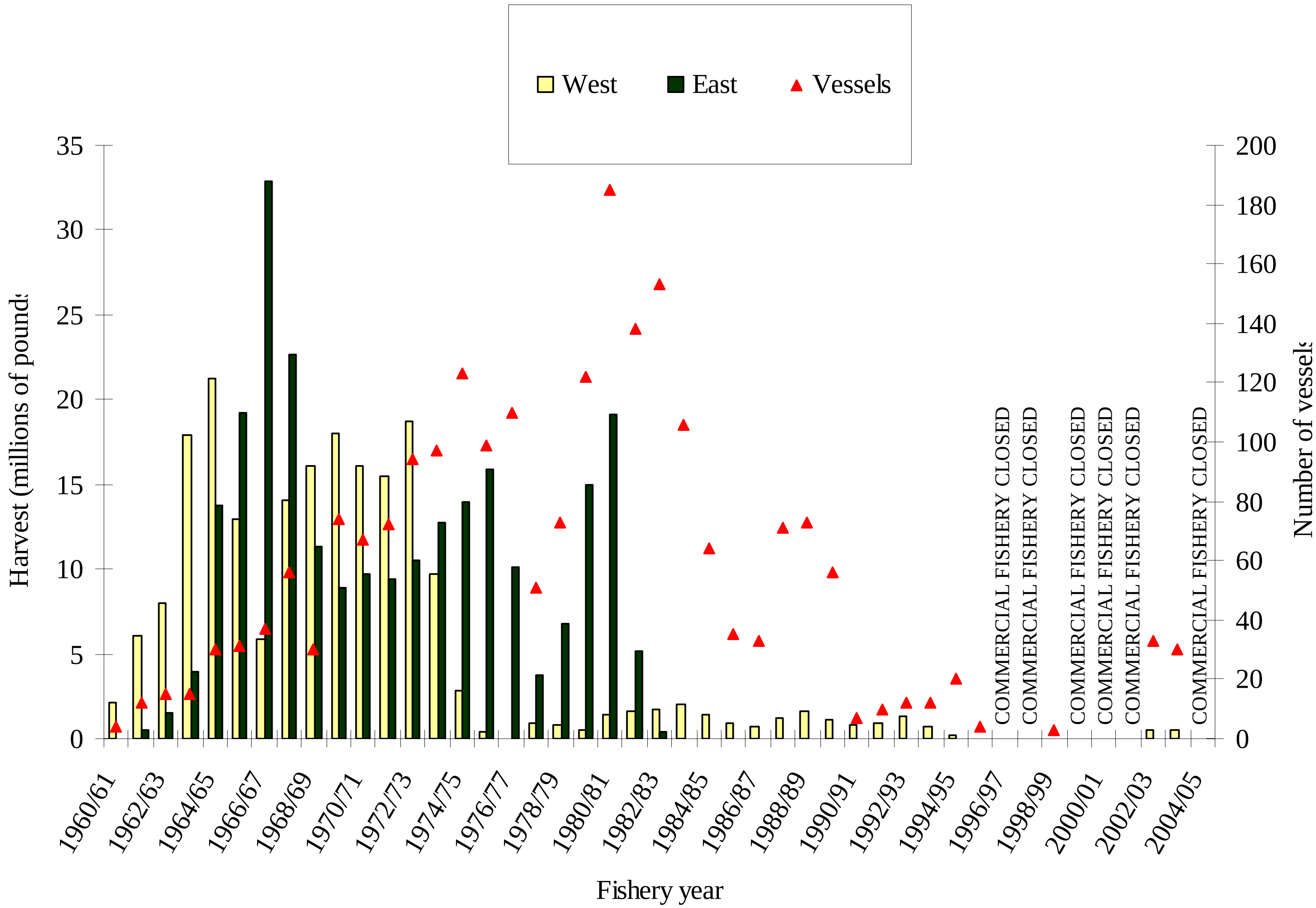

Figure 1-3.-Aleutian Islands red king crab fishery harvest and vessel effort, 1960/61 - 2004/05.

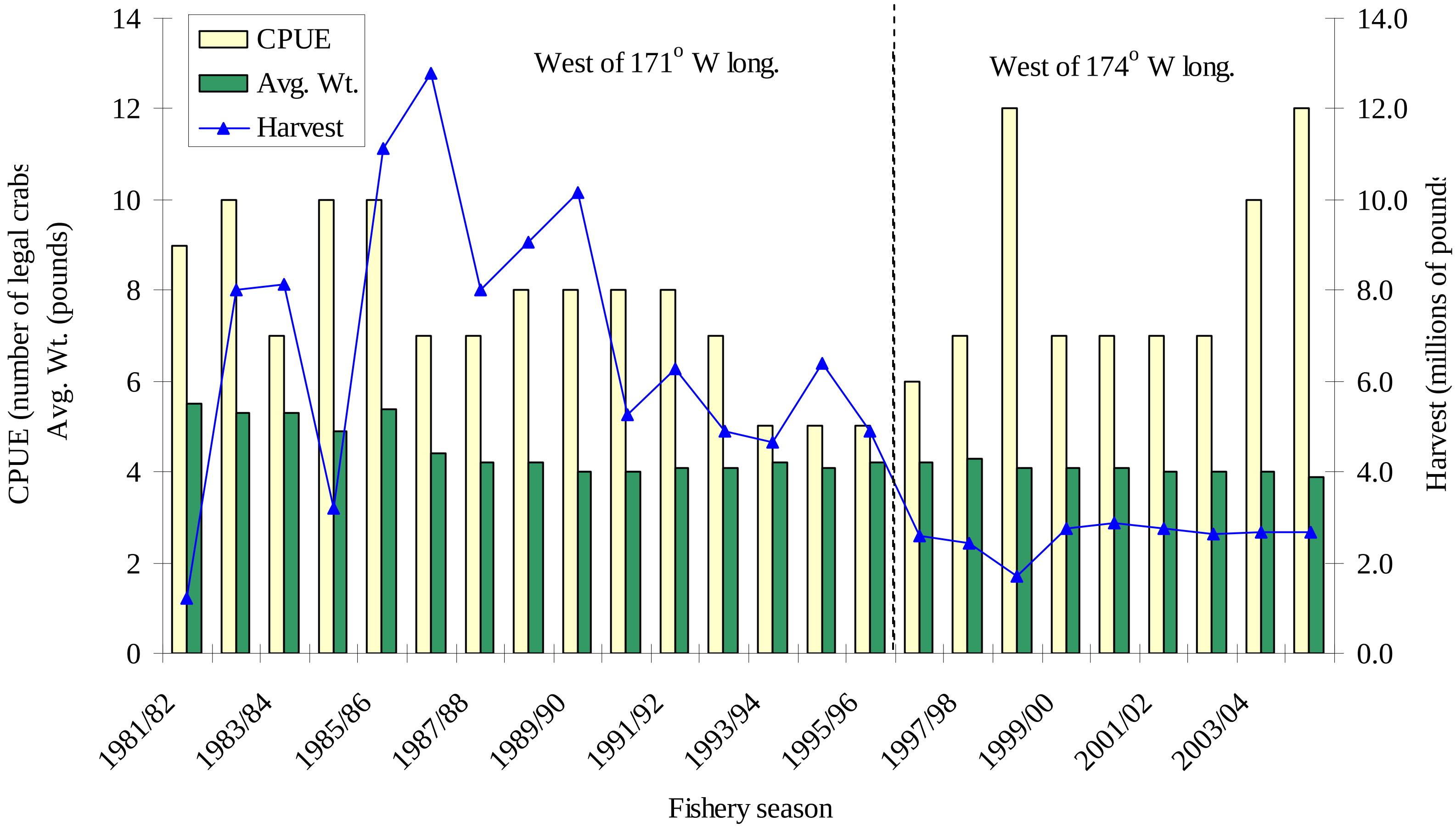

Figure 1-4.-Western Aleutian Islands golden king crab fishery harvest, fishery performance and average weight data for the 1981/82 **-** 2004/05 seasons.

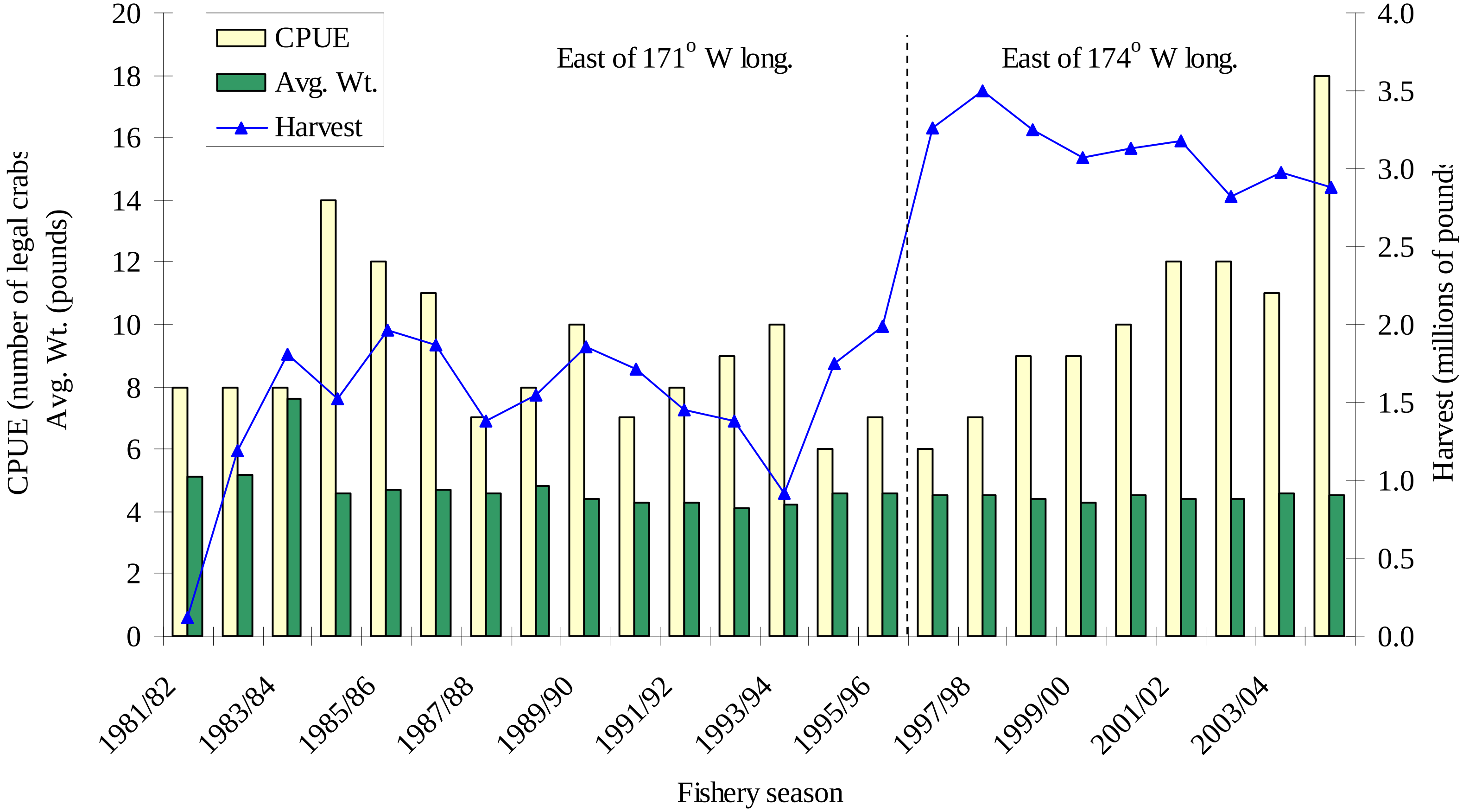

Figure 1-5.-Eastern Aleutian Islands golden king crab fishery harvest, fishery performance and average weight data, 1981/82 - 2004/05 seasons.

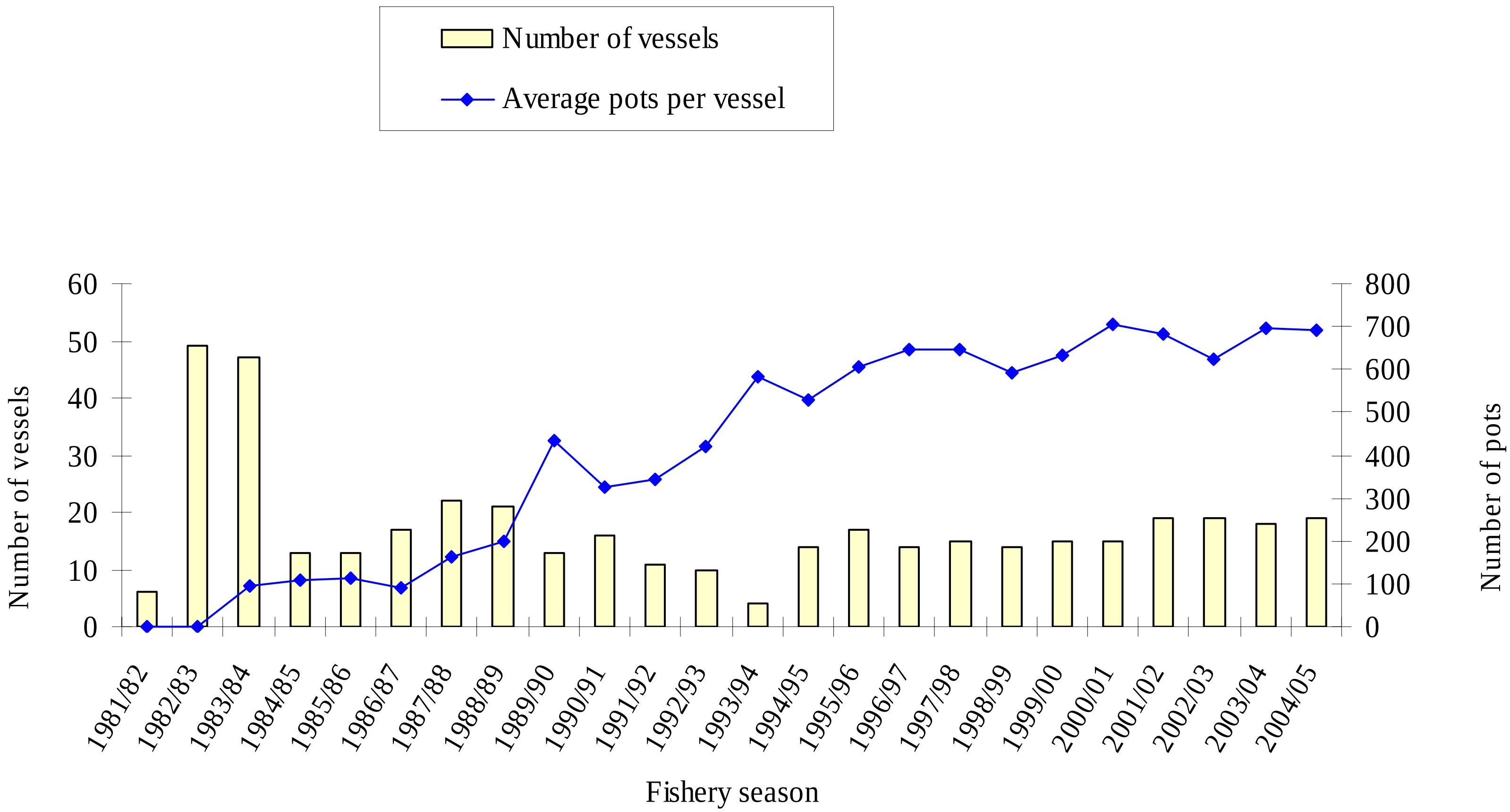

Figure 1-6.-Eastern Aleutian Islands golden king crab fishery vessel registrations and average number of pots per vessel 1981/82 **-** 2004/05.

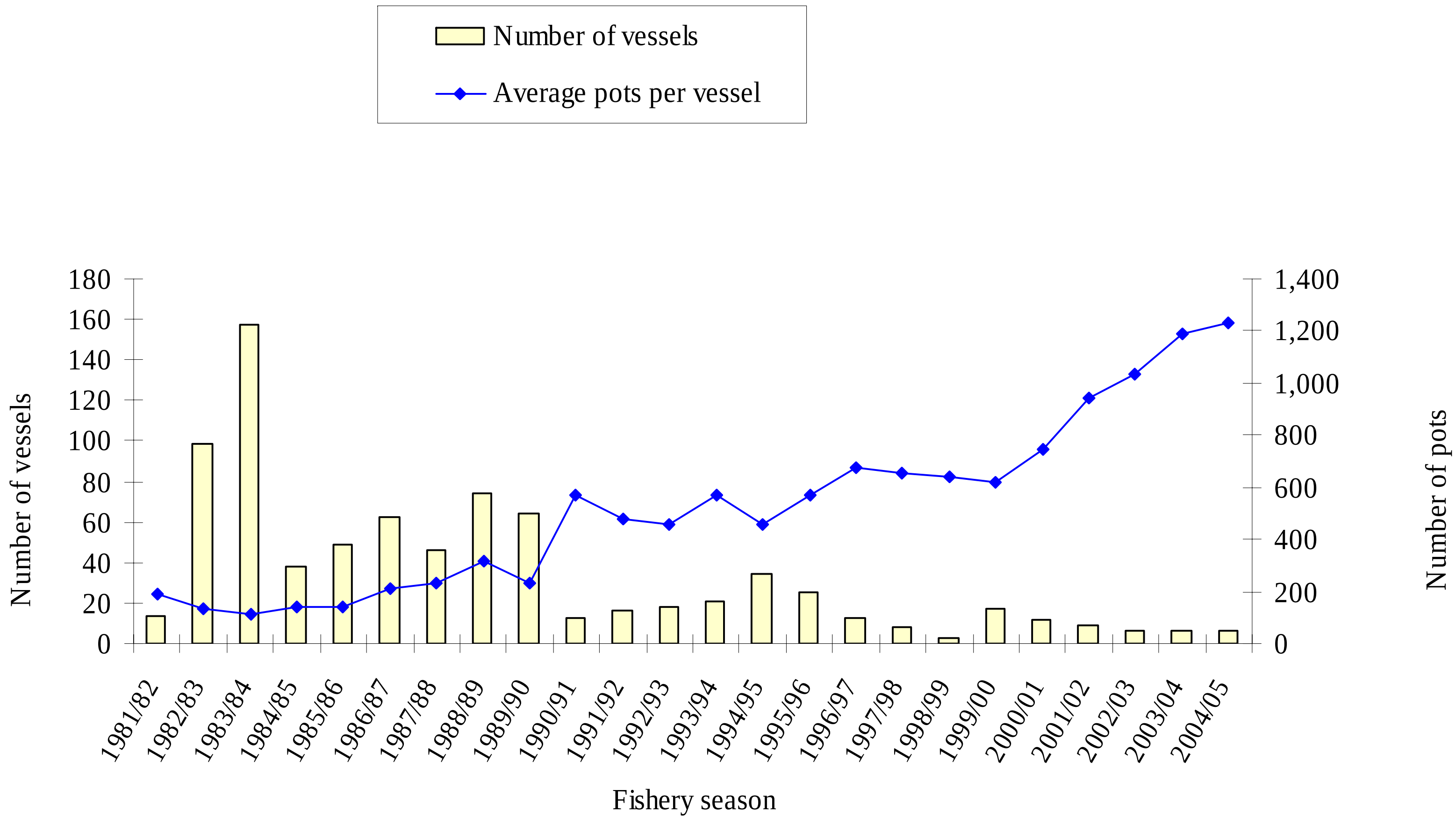

Figure 1-7.-Western Aleutian Islands golden king crab fishery vessel registrations and average number of pots per vessel 1981/82 **-** 2004/05.

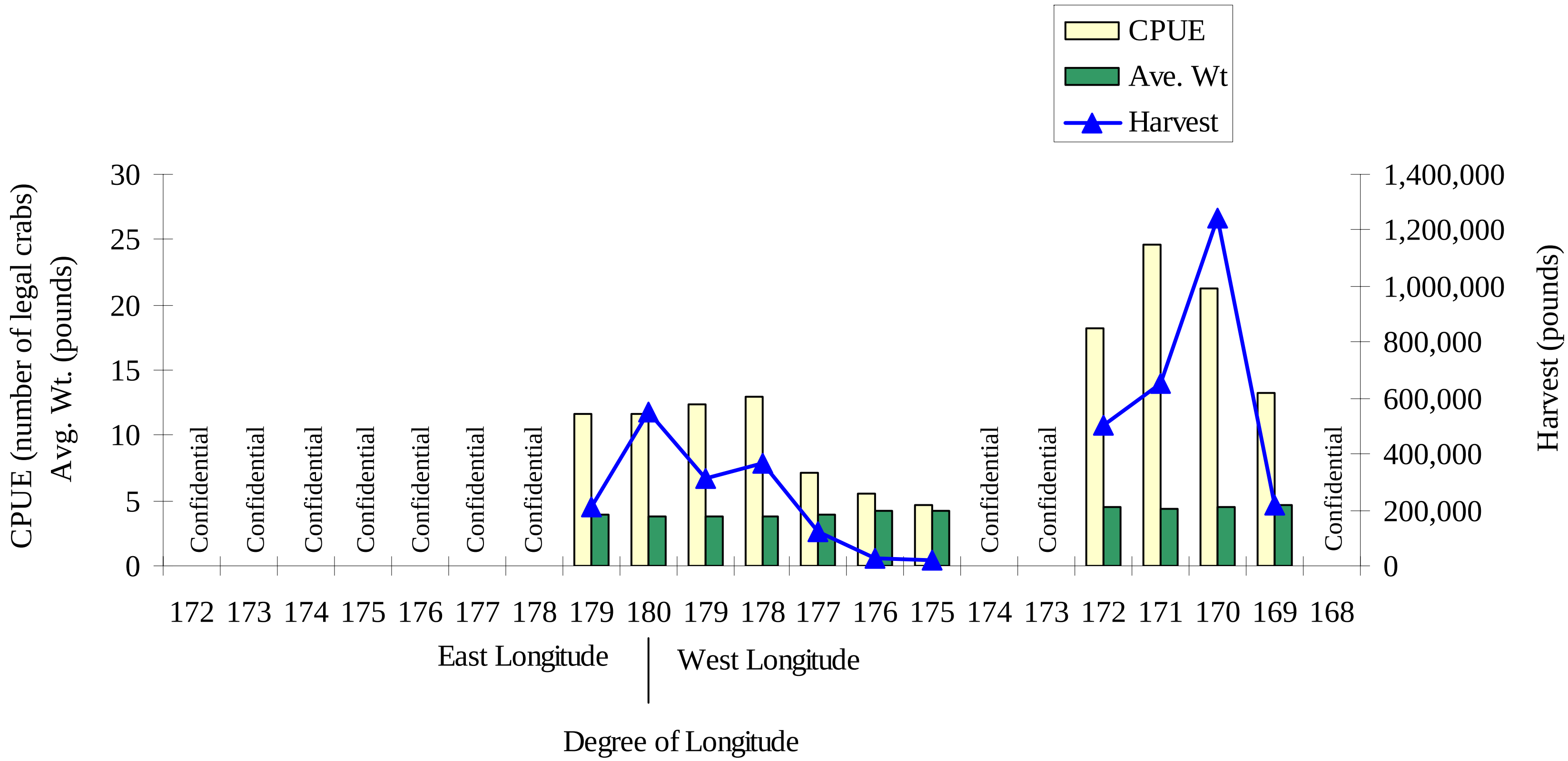

Figure 1-8.-Aleutian Islands golden king crab fishery harvest, catch per unit of effort and average weight data by degree of longitude, 2004/2005.

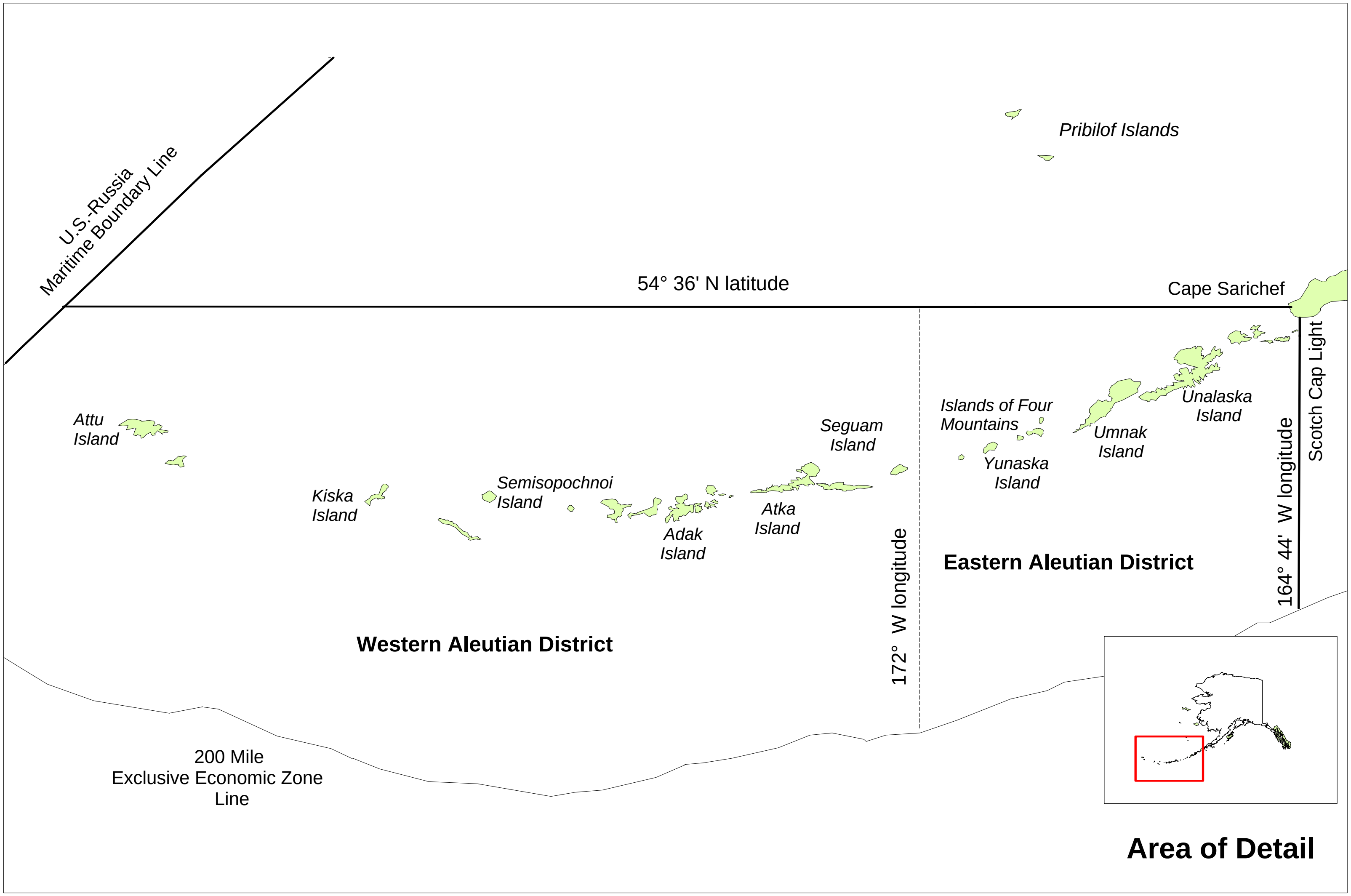

Figure 1-9.-Eastern and Western Aleutian Districts of Tanner crab Registration Area J.

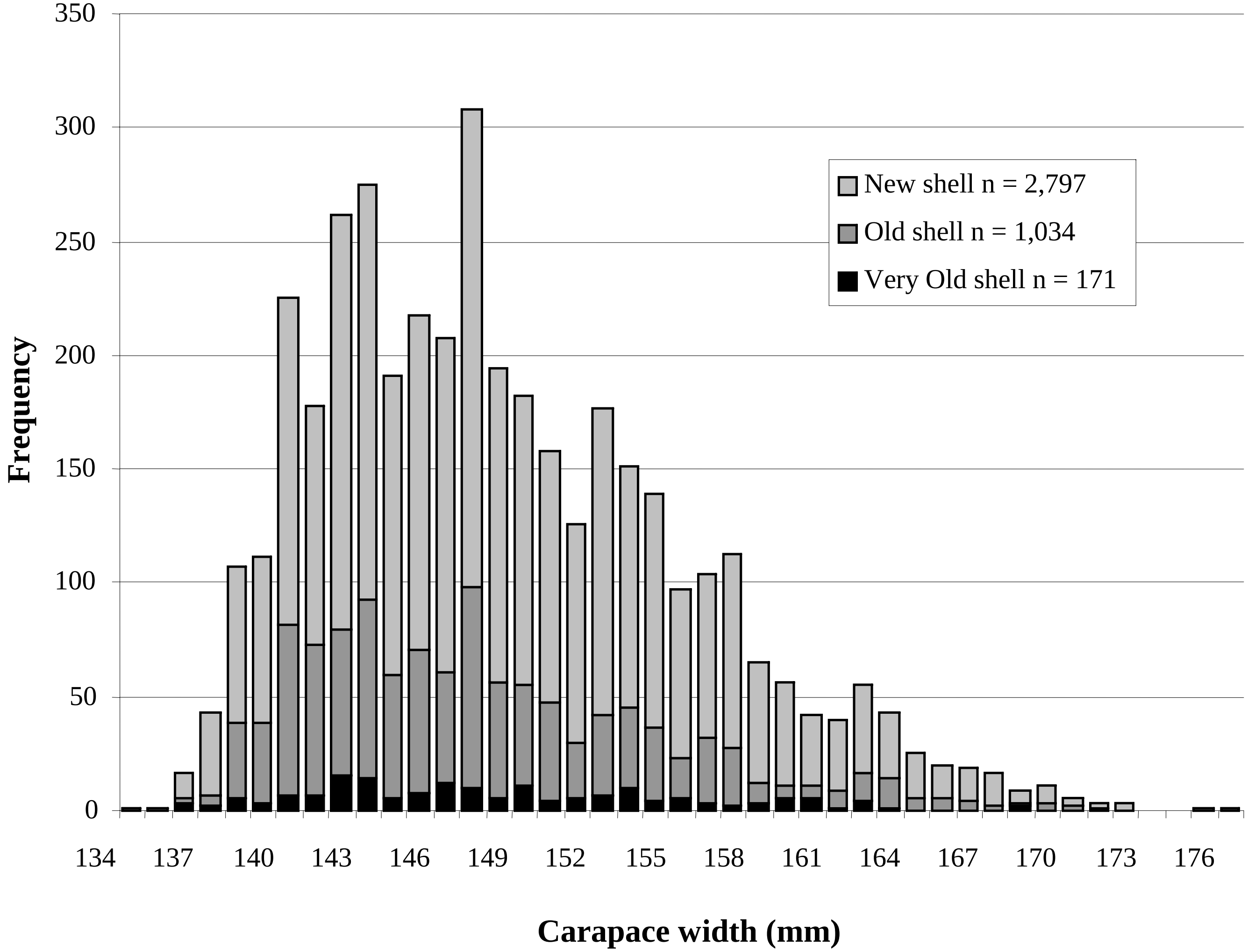

Figure 1-10.-Carapace width and shell condition from the 2004 Eastern Aleutian District Tanner crab fishery.

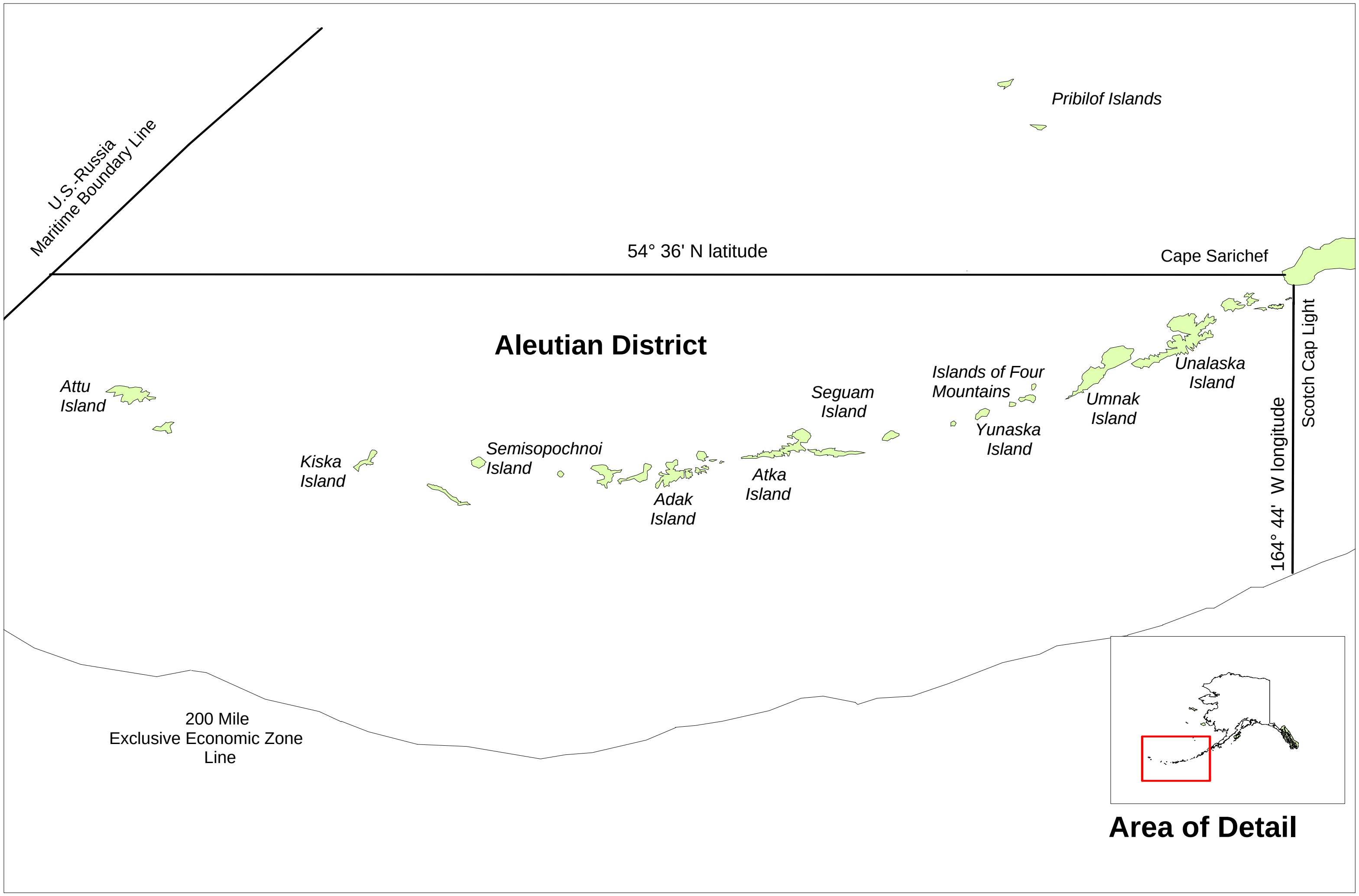

Figure 1-11.-Aleutian District for Dungeness crab management.

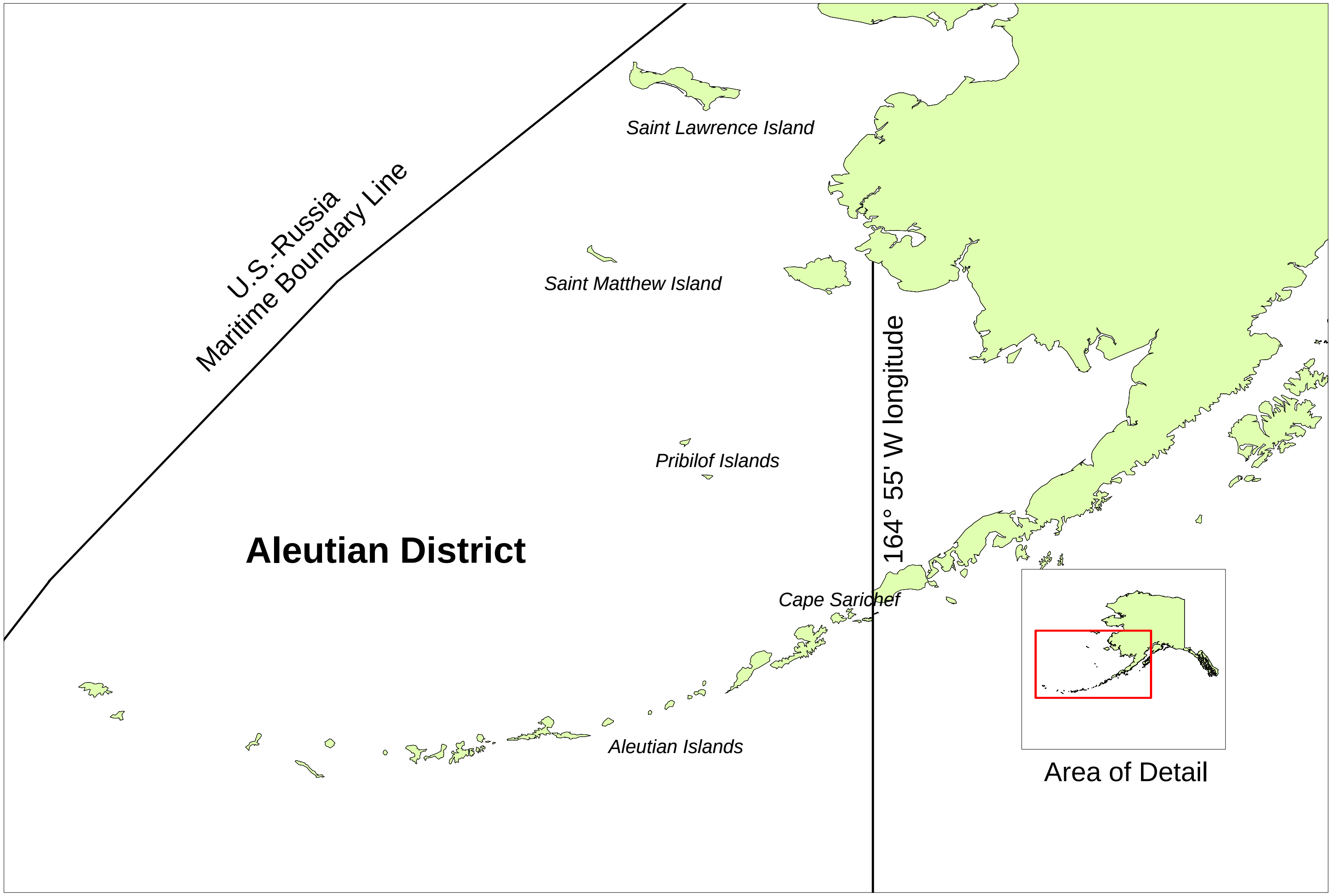

Figure 1-12.-Aleutian District for shrimp management.

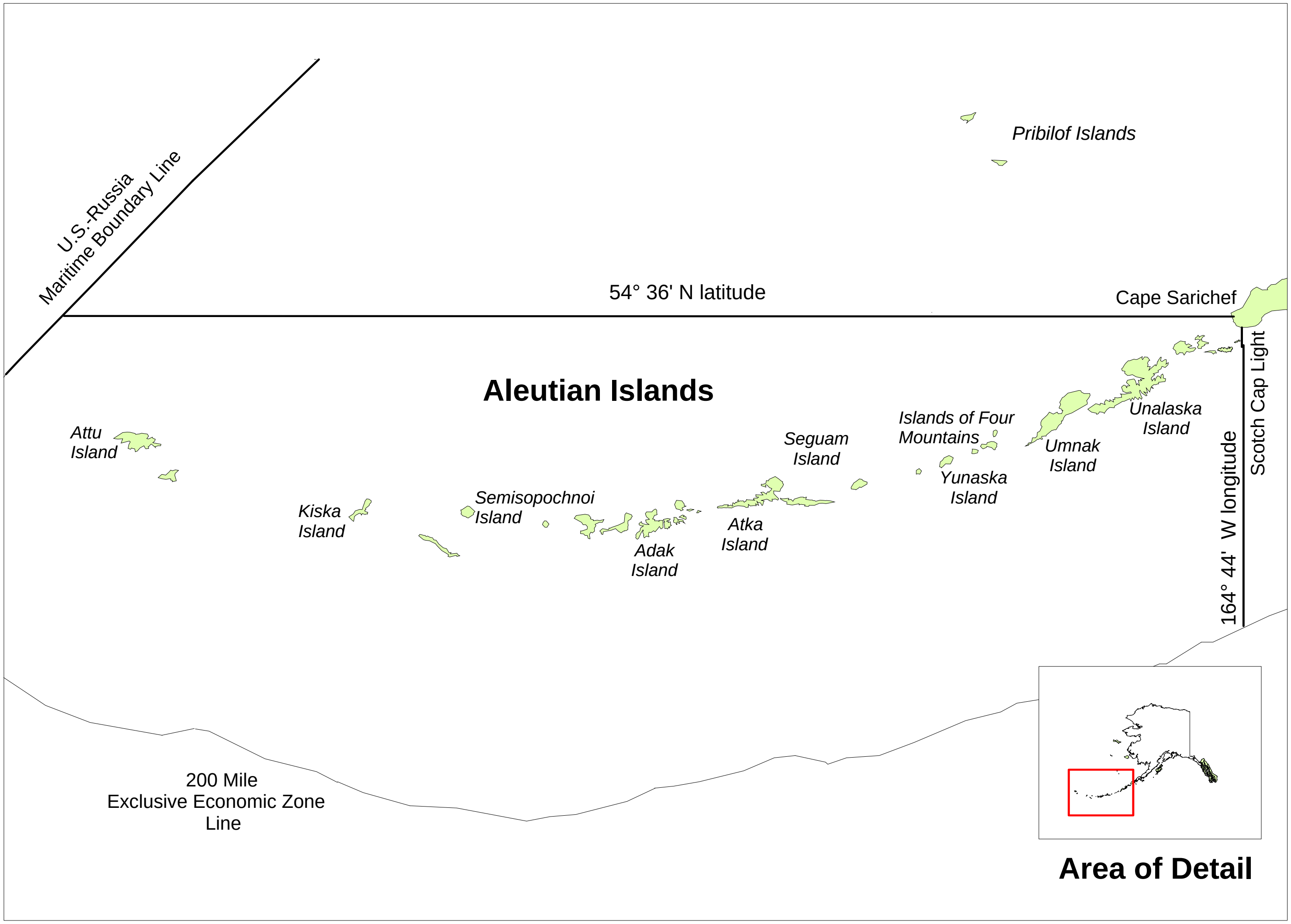

Figure 1-13.-Aleutian Islands portion of miscellaneous shellfish Registration Area J.

ANNUAL MANAGEMENT REPORT FOR THE COMMERCIAL SHELLFISH FISHERIES OF THE BERING SEA, 2004

Forrest R. Bowers, Barbi Failor-Rounds, and Michael E. Cavin, Jr.

\Dutch Harbor Area Office, P.O. Box 920587, Dutch Harbor, Alaska 99692

KING CRAB REGISTRATION AREA T BRISTOL BAY

DESCRIPTION OF AREA

King crab Registration Area T (Bristol Bay) includes all waters of the Territorial Sea (0-3 nautical miles from shore) and all waters of the Exclusive Economic Zone (3-200 nautical miles from shore) north of the latitude of Cape Sarichef (54° 36' N lat.), east of 168° W long., and south of the latitude of Cape Newenham (58° 39' N lat.) (Figure 2-1).

HISTORIC BACKGROUND

Commercial fishing for red king crabs *Paralithodes camtschaticus* in the Bering Sea began with Japanese harvests in 1930. The Japanese fishery ended in 1940 and resumed again from 1953 until 1974. The Russian king crab fleet operated in the eastern Bering Sea from 1959 through 1971. U.S. fishers entered the eastern Bering Sea fishery with trawl gear in 1947. Effort and catches declined in the 1950s, with no catch reported in 1959. A period of low catches followed through 1966 before the domestic fishery expanded to full-scale in the late 1970s.

The red king crab fishery in the eastern Bering Sea traditionally harvested crabs from waters north of Unimak Island and the Alaska Peninsula from Cape Sarichef to Port Heiden. With the decline of king crab stocks in other areas of the state, U.S. effort in the eastern Bering Sea increased beginning in 1966 with a peak harvest of 129.9 million pounds in 1980 (Table 2-1, Figure 2-2). Since 1980, king crab stocks throughout Alaska, including Bristol Bay, declined sharply and have not recovered to pre-1980 levels, leading to closures of the Bristol Bay red king crab (BBRKC) fishery in 1983, 1994, and 1995. From 1980 to 2001, economic value of the BBRKC fishery ranged from $8.9 million in 1982 to a high of $115.3 million in 1980 (Table 2-2, Figure 2-3). Exvessel price ranged from $0.90 per pound in 1980 to a high of $6.26 per pound in 1999.

In 1980, the Alaska Board of Fisheries (BOF) defined that portion of the Bering Sea south of Cape Newenham and east of 168^{o} W long. as the Bristol Bay King Crab Registration Area T, and the area was designated an exclusive registration area. During any king crab registration year (June 28 through June 27), vessels registering for and fishing in this area are prohibited from fishing in any other exclusive or super-exclusive king crab registration area. Only non-exclusive areas may be fished once a vessel is registered in Area T.

The National Marine Fisheries Service (NMFS) has conducted annual trawl abundance index surveys of the eastern Bering Sea since 1968. This multi-species (crab and groundfish) survey is conducted during the summer months and the resulting area-swept estimates of abundance are published annually. In 1983, the NMFS Bering Sea trawl survey indicated a record low number of legal male crabs and the lowest total red king crab population ever recorded in Bristol Bay. Small female crabs carrying fewer eggs and high predator abundance were also noted. Consequently, the BBRKC fishery was closed for the 1983 season. The fishery reopened in 1984 and catches slowly increased to over 20.3 million pounds in 1990. Due to the large number of catcher-processors and floating-processors in the fishery and the inability of the Alaska Department of Fish and Game (ADF&G) to monitor these catches, an onboard observer program was initiated in 1988. Fishing effort increased dramatically from 89 vessels in 1984 to over 300 vessels in 1991 (Table 2-1, Figure 2-3). The number of pots used by the fleet also increased, with almost 90,000 pots registered for the 1991 fishery compared to just under 22,000 pots registered in 1984.

Due to the increased number of pots, the BOF established a 250-pot limit enforced through a buoy sticker program, which was implemented for the 1992 BBRKC fishery. This measure was intended to improve manageability of the fishery by extending the length of the season as well as reducing the potential for pot loss and gear conflict.

Immediately following the 1992 BBRKC fishery, the 250-pot limit was repealed by NMFS. This action was taken because of inconsistencies between the state regulations and provisions of the Fishery Management Plan for Bering Sea/Aleutian Islands King and Tanner Crabs (FMP), mandating application of pot limits in a nondiscriminatory manner (NPFMC 1998). In the spring of 1993, the BOF adopted new regulations, setting pot limits based on overall vessel length. For the BBRKC fishery, vessels in excess of 125 feet in overall length were limited to 250 pots and vessels 125 feet and under in overall length were allowed a maximum of 200 pots. These pot limits were administered through a buoy tag program from the Dutch Harbor and Kodiak ADF&G offices.

Voluntary daily vessel reports received via single side band (SSB) radio and marine telex have been used to manage the BBRKC fishery since 1993. The 1993 season lasted nine days and the total harvest was 14.6 million pounds, approximately 2.2 million pounds less than the 16.8 million pounds harvest guideline.

Results of the NMFS 1994 summer trawl survey of the Eastern Bering Sea indicated declines in all size-classes of both male and female red king crabs in the Bristol Bay area. Compared to observations made during the 1993 survey, the abundance index of large male crabs decreased 25%. Based on the 1994 survey results, large female abundance was estimated at 7.5 million crabs, which was below the minimum threshold of 8.4 million crabs necessary to allow a fishery. Consequently, the BBRKC fishery was not open for the 1994 season.

To address potential measurement errors in the area-swept trawl abundance estimates, ADF&G developed a length-based analysis (LBA) model for estimating population abundance. This method, used for the first time prior to the 1995 season, incorporates a variety of data sources including dockside sampling and observer collected data, as well as data collected on the annual NMFS survey. The LBA is less susceptible to year-to-year variations in factors unrelated to population abundance (i.e. oceanographic conditions, changes in species distribution, and subsequent availability to the survey gear) and is therefore more likely to produce an accurate estimate of abundance. Analysis of the 1995 NMFS survey using the LBA model indicated no significant difference in the abundance of mature male and female red king crabs from estimates made from the 1994 survey (Zheng et al. 1995). Based on these combined results, the BBRKC fishery remained closed for the 1995 season.

Due to the depressed status of the BBRKC population, the BOF, at their March 1996 meeting adopted a revised harvest strategy to promote stock rebuilding. One of the most significant changes to the harvest strategy was a reduction in the exploitation rate of mature male crabs from 20% to 10% at levels below where the stock is considered rebuilt (55 million pounds of effective spawning biomass (ESB)), or 15% when the stock is considered rebuilt.

Results from the LBA incorporating the 1996 NMFS survey data indicated increased abundance in all size classes of males and females compared to the 1995 estimate (Zheng et al. 1996). Of major importance was an increase in the number of large females in 1996 to 10.2 million crabs, which was well above the threshold of 8.4 million large female crabs necessary to allow a fishery. This was a significant increase relative to the prior two years where fishery closures occurred due to insufficient numbers of large female crabs. Based on a 10% mature male exploitation rate, the 1996 guideline harvest level (GHL) was set at 5.0 million pounds. The 1996 fishery lasted four days and a total of 8.4 million pounds were harvested, exceeding the GHL by 68%.

To address the difficulty in managing this fishery at low GHLs, the BOF held a special meeting in August of 1997 implementing new pot limits and vessel preseason registration requirements. Also adopted were regulations that extended the tank inspection window for the BBRKC fishery from 24 to 30 hours and allowed fishers to leave baited pots on the fishing grounds when a fishery closure announcement is made with less than 24 hours of advance notice. New pot limits were based on vessel overall length, the preseason GHL, and the number of vessels preseason registered for the fishery. These new pot limit regulations were adopted with a sunset provision of December 31, 1998, to provide for reevaluation at the 1999 BOF meeting.

The LBA, using the 1997 NMFS survey data, indicated that all components of the BBRKC crab stock increased from levels observed in 1996 (Zheng et al. 1997). ESB was below the 55 million pound threshold necessary to allow a 15% harvest rate. Therefore, a 10% mature male exploitation rate was used, generating a general fishery GHL of 7.0 million pounds for the 1997 season. Based on the GHL and number of vessels that filed a preseason registration, pot limits were set at 100 and 125 pots for small and for large vessels, respectively. The 1997 fishery lasted four days and a total of 8.8 million pounds were harvested. The 1997 harvest exceeded the GHL by 26%, largely due to extremely high catch rates in the final hours of the fishery.

Analysis of the 1998 NMFS survey data indicated the abundance of pre-recruit male red king crabs increased by 85%, resulting in an increase in the fishable stock of mature male crabs for the 1998 season. The abundance of large females (>89 mm carapace length (CL)) increased by 42% (Stevens et al. 1998a). Effective spawning biomass was estimated to be over 55 million pounds, resulting in a 15% harvest rate on mature male crabs. The GHL for the 1998 general fishery (non-Community Development Quota) was 15.8 million pounds. Because the GHL was in excess of 12 million pounds, the preseason registration requirement was waived and pot limits were set at 200 for vessels less than or equal to 125 feet in length and 250 for vessels greater than 125 feet in length. Total harvest in the 1998 fishery, which lasted five days, was 14.2 million pounds.

At the March 1999 meeting, the BOF made permanent the interim management measures that were adopted in the fall of 1997. The BOF also passed anti-prospecting regulations that were amended in 2000. The regulations prohibit vessels from participating in the Bristol Bay king crab fishery if they have operated pot, longline, or trawl gear in that portion of Registration Area T north of 55° 30’ N lat. and east of 164° W long. during the 30 days immediately prior to the opening of the king crab season. However, an exception was made for vessels participating in a directed pollock fishery with trawl gear in Area T north of 55° 30’ N lat. and east of 164° W long. during the 14 days prior to the red king crab season. These vessels may participate in the BBRKC fishery if they delivered to an offshore processor or had 100 percent federal groundfish onboard observer coverage for the entire 14 days prior to the opening. The BOF also adopted a regulation that moved the opening date of the commercial red king crab fishery in Bristol Bay from November 1 to October 15. The change to an earlier opening was intended to improve fleet and industry efficiency by reducing the hiatus between the BBRKC fishery and the Bering Sea king crab fisheries, opening on September 15.

The LBA, including the 1999 NMFS survey data, indicated that while the abundance of legal and mature male red king crabs in Bristol Bay increased, all other classes decreased from the 1998 level: small males by 57%, pre-recruit males by 27%, and large females by 7% (Zheng and Kruse 1999). The LBA estimates resulted in an ESB of 47.0 million pounds. By applying an exploitation rate of 10% to the mature male population, a general fishery GHL of 10.1 million pounds was set. The 1999 season lasted five days, with a total harvest of 11.1 million pounds.

LBA estimates made in 2000 indicated that the abundance of almost all size-classes of the Bristol Bay red king crab stock decreased from levels observed in 1999. Small males increased by 192%, but all others decreased: pre-recruit males by 23%, mature males by 14% and legal males by 3%. Large females also decreased by 10% (Zheng and Kruse 2000). The 2000 ESB was estimated to be 39.9 million pounds, a decrease of 11% compared to 1999. At 39.9 million pounds, ESB was above the threshold for a fishery opening with a 10% exploitation rate on mature males. The 10% exploitation rate on mature males resulted in a general fishery GHL of 7.7 million pounds. The 2000 fishery opened at 4:00 PM on October 16 after a 24-hour delay to allow strong winds in the Bristol Bay area to diminish. A total of 239 catcher-only vessels and seven catcher-processors participated. However, only 244 vessels made landings. A total of 7.6 million pounds of red king crabs was harvested in the 4.2-day fishery, which was closed by emergency order at 9:00 PM on October 20.

Results of the NMFS stock assessment survey and LBA in 2001 gave an estimated ESB of 40.6 million pounds and a mature male abundance estimate of nearly 11 million crabs. As specified in regulation, a 10% exploitation rate was applied to the mature male abundance estimate resulting in a general fishery GHL of 7.2 million pounds. The 2001 fishery opened at 4:00 PM on October 15 with 232 vessels registered (two registered vessels did not make landings). The fishery closed at 11:59 PM on October 18 after approximately 7.8 million pounds were harvested.

In 2002, survey results provided an estimated ESB of 37.7 million pounds and a mature male abundance estimate of 14.3 million crabs. A 10% exploitation rate was applied to the mature male abundance resulting in a general fishery GHL of 8.6 million pounds. The 2002 fishery opened at 4:00 PM on October 15 with 242 vessels registered. The fishery closed at NOON on October 18 after approximately 8.9 million pounds were harvested.

In 2003, the BOF modified the BBRKC harvest strategy. The BOF maintained the existing 10% and 15% harvest rates on mature males and implemented a 12.5% harvest rate on mature males when the ESB is greater than or equal to 34.75 million pounds but less than 55 million pounds. NMFS survey and LBA results for 2003 indicated that the stock was above the fishery threshold with an estimated abundance of 29.7 million mature females and an estimated ESB of 60.7 million pounds. Both of these estimates represented substantial increases from those generated in 2002. Since ESB was estimated to be greater than 55.0 million pounds, the harvest strategy specifies an exploitation rate of 15% on mature males. Given an estimated mature male abundance of 16.4 million crabs and an average weight of 6.4 pounds per legal crab, the 2003 GHL was set at 15.7 million pounds, 1.2 million pounds of which were allocated to the Community Development Quota fishery. A total of 252 vessels participated in the 122 hour general fishery and harvested 14.5 million pounds.

AMERICAN FISHERIES ACT

The American Fisheries Act (AFA), passed in 1998 by Congress, gave pollock fishers exclusive fishing privileges in the Bering Sea/Aleutian Islands (BSAI) pollock fishery. To protect the interests of fishers not directly benefited by the AFA, sideboards were established for AFA fishers qualified to participate in BSAI crab fisheries. To implement the sideboards, the BOF developed a management plan requiring ADF&G to manage AFA vessels with a harvest cap equally apportioned between all AFA qualified vessels or through a cooperative fishery when 100% of AFA qualified participants agree to the cooperative. The harvest cap specified by the AFA was implemented for the first time in the 2000 BBRKC fishery.

Of the 239 catcher-only vessels that participated in the 2000 BBRKC fishery, 25 participated under AFA sideboards. The AFA vessels fished in a cooperative manner with a fixed harvest cap of 10.96% of the general fishery GHL, or 0.9 million pounds. Post-season production reports show that AFA vessels harvested approximately 0.7 million pounds or 84.7% of their cap.

During the 2001 BBRKC fishery, 31 vessels participated under the AFA sideboards and fished in a cooperative manner. The fleet harvested 0.70 million pounds of a 0.72 million pound cap. Most of the vessels fishing under the AFA sideboards in 2001 were not constrained by the cap.

In 2002, 31 vessels participated under the AFA sideboards and fished in a cooperative manner. Twenty-seven of the AFA vessels were constrained by the cap and stopped fishing prior to the closure. Several of the participating vessels exceeded the individual limits, however the AFA fleet remained under the cap and harvested 917,676 pounds, or 97.6% of the 939,842 pound cap.

Fishers restricted under the AFA cap in the general fishery made a substantial change to their fishing practices in 2003. All but two of the participating vessels chose to be assigned a preseason trip limit rather than fish competitively until 80% of the cap was reached before receiving a limit. The AFA fleet made the change in an attempt to address perceived inequities in the prior management approach. Ten of the 32 AFA vessels reached their trip limit and stopped fishing prior to the closure. Harvest information for the two vessels participating in the competitive fishery is confidential. The AFA fleet remained well under the cap and harvested 1,189,013 pounds or 75% of the cap.

2004 FISHERY

Preseason vessel registration was required by 5:00 PM, September 24, 2004. Based on the 252 preseason vessel registrations received prior to that deadline and the 14.267 million pound general fishery GHL, pot limits were set at 200 pots for vessels less than or equal to 125 feet in overall length and 250 pots for vessels greater than 125 feet in overall length. In addition, preseason vessel registrations were used to select 21 catcher vessels to carry onboard observers during the fishery. Eight catcher processors and one floating processor registered for the fishery. Based on preseason effort levels and recent catch rate data, the department chose to manage the 2004 fishery through inseason catch reports from fishers rather than with a closure announced prior to the opening. As part of the inseason management process, the department advised the fleet that catch updates would be made daily at noon and 9:00 PM and that the department would attempt to provide the fleet with 24-hours advance notice of the closure announcement, but given the small GHL, less than 24-hours advance notice was possible.

During the week preceding vessel registration, department staff consulted with United States Coast Guard (USCG) search and rescue personnel and National Weather Service (NWS) forecasters regarding a potential weather-related delay in season opening. NWS staff did not forecast storm force winds in the operational area of vessels that would be travelling to the Bristol Bay red king crab fishing grounds from Dutch Harbor, Akutan, King Cove or False Pass, nor were storm force winds forecast for the time period October 15-18. USCG personnel did not foresee that current or forecast weather conditions would hamper a search and rescue mission immediately before or during the first 18 hours of the fishery, thus the season was not delayed.

Vessel hold and gear inspections as part of the “quick registration” process began October 8 in Dutch Harbor, Akutan, and King Cove and October 10 in False Pass. Vessel registration began at 10:00 AM, October 14. A total of 251 vessels registered for the fishery that began at 4:00 PM, October 15. Prior to the season, the department registered 131 vessel operators to participate in the voluntary inseason catch reporting program. Observers on 28 additional vessels contributed daily catch reports as well. Catch reports were first received at 6:00 PM October 15; however, these reports represented only the first two hours of the season and no catch was reported.

By 6:00 AM October 17, the non-AFA fleet catch rate was approximately 25 legal crabs per pot lift, the fleet pulled approximately 13,900 pots in the preceding twelve hours and the cumulative harvest had reached 4.4 million pounds (Table 2-3). By 6:00 PM October 17, catch per unit of effort had decreased slightly to 23 legal crabs per pot lift; however, the number of pot lifts increased to 15,300 pots in the previous 12 hours. The cumulative catch at 6:00 PM October 17 was 6.7 million pounds and the fleet was harvesting approximately 2.33 million pounds every 12 hours. Based on catch reports received through 6:00 PM October 17 and the most recent 12-hour harvest, the department issued a news release at 9:00 PM on October 17 stating that the GHL would be met and that the fishery would close at 11:59 PM October 18. Eighty-nine vessel operators participated in the inseason management process by providing at least one catch report during the fishery.

Catch reports received from the fleet on the 18th indicated that catch per unit of effort remained steady in the first 12-hour report period after the closure announcement, but then fell to approximately 14 legal crabs per pot lift in the final hours of the fishery. The fleet pulled nearly 40,000 pots in the final 24 hours of the fishery. The general fleet harvest projection including the AFA fleet portion based on inseason reports received after the closure announcement was approximately 15.1 million pounds. Actual harvest was 14,112,438 pounds, or 98.9% of the GHL.

The fleet was provided with more than 24 hours of advance notice of the fishery closure, thus all gear was required to be unbaited and stored with the doors open, or removed from the water at the time of the closure. The majority of the fleet was able to comply with this requirement; however, 13 vessels experienced mechanical problems or delays that caused them to have gear stored illegally.

Fishers restricted under the AFA cap in the general fishery operated in a voluntary cooperative similar to the voluntary cooperative formed in 2003. All but three of the participating vessels chose to be assigned a preseason trip limit rather than fish competitively until 80% of the cap was reached before receiving a limit. Catch rates of the 32 vessels participating in the AFA voluntary cooperative during the general fishery were slightly higher than those recorded by the non-capped portion of the fleet. Vessels operating under the AFA cap had an average CPUE of 27 legal crabs per pot lift (Table 2-4) compared to 22 legal crabs per pot lift for the non-AFA fleet. Seventeen of the 29 AFA vessels fishing under an individual trip limit reached their trip limit and stopped fishing prior to the closure. Two of the three vessels participating in the competitive fishery reached 80% of their portion of the cap. The AFA fleet remained under their cap and harvested 1,462,535 pounds or 94% of the cap.

The 2004 Bristol Bay red king crab fishery was 80 hours in length, a 34% decrease from the 2003 season length of 122 hours. Only the 2002 season at 68 hours was shorter (Table 2-2). The 2004 legal male CPUE was 23, an increase from the 2003 catch rate of 18 legal crabs per pot lift and the highest legal male CPUE since the 1980 season (Table 2-1). Catch rates were highest north of 56° 30’ N lat (Table 2-5). ADF&G statistical areas in the southwestern portion of the fishing grounds that showed average or above average catch rates in 2002 and 2003 were below average in 2004. Catches were distributed over a broader geographic area in 2004 than in 2003. Harvests of 1.0 million pounds or more were recorded from six ADF&G statistical areas in 2004 compared to four in 2003 and five in 2002. In general, the highest catch rates during the 2004 fishery occurred to the north of the most productive areas in the 2003 fishery. The fleet pulled 90,972 pots to harvest 14,112,438 pounds.

Fishers were paid an average price of $4.71 per pound by shore plants in Dutch Harbor, Akutan, King Cove, Sand Point and Kodiak. In addition, one floating processor and two catcher processors purchased crabs after the season. The 2004 Bristol Bay red king crab fishery had an exvessel value of $65.7 million, a 9.6% decrease from the 2003 exvessel value of $72.7 million (Table 2-2).

Weather conditions during the 2004 Bristol Bay red king crab fishery were generally favorable until late in the fishery when operation of some vessels was slowed due to high seas. No vessels or fishers were lost during the fishery.

The Alaska Bureau of Wildlife Enforcement (ABWE) stationed personnel in all ports where Bristol Bay red king crabs were landed. ABWE personnel did not cite any vessel operators for possession of undersized crabs in 2004. In 2003 ABWE seized 14,955 pounds of illegal king crab valued at approximately $75,000.

ADF&G conducted cost-recovery fishing operations after the closure of the 2004 Bristol Bay red king crab general fishery. The cost-recovery projects harvested 201,579 pounds of Bristol Bay red king crabs (Table 2-6), worth $1,000,686 (Table 2-7). The 2004 cost-recovery fishery was the second largest in terms of pounds harvested and the most valuable since the program began in 1990. The cost-recovery fishery is part of an ongoing program used to collect funds to conduct research on Bering Sea shellfish and to fund the BSAI crab observer program.

DOCKSIDE SAMPLING

Red king crabs were sampled at dockside from deliveries occurring after the closure of the 2004 Bristol Bay red king crab general fishery. Confidential interviews were conducted with vessel captains to acquire detailed information regarding statistical areas fished, effort and fishery performance. Biological data collected consists of carapace length measurements, average weight, and shell-age determination.

The Bristol Bay red king crab fleet made 215 deliveries to shoreside processing facilities in 2004. ADF&G observers collected biological data from 23 of those deliveries while ADF&G dockside sampling staff performed skipper interviews and collected biological data from 153 (80%) of the remaining non-observed shoreside deliveries. Approximately 5% of the crabs delivered in the 2004 Bristol Bay red king crab fishery were counted and weighed to generate estimates of average weight. Landed crabs averaged 6.8 pounds, an increase of 0.6 pounds per crab from the 2003 fishery average weight and a 0.36-pound increase from average weight used when setting the GHL.

Less than 1% of the crabs delivered were sampled for size and shell-age. Biological sampling indicated that 79% of the crabs measured were new shell, 15.2% were old shell and 6% were very old shell (Table 2-8, Figure 2-4). These proportions are nearly unchanged from those observed during the prior three seasons. Average carapace length was 154 mm, an increase of 5 mm from 2003 and the largest annual increase in carapace length since 1978/79. The percentage of recruit-sized crabs in the commercial harvest decreased from 72% in 2003 to 52% in 2004. This decrease is consistent with length frequency distributions generated from survey data showing a peak in legal male abundance at about 150 mm carapace length. In 2003, peak legal male abundance was at approximately 140 mm carapace length.

STOCK STATUS

The status of the Bristol Bay red king crab stock is evaluated through the use of abundance-based thresholds. When the total mature biomass (TMB) of red king crabs in Bristol Bay falls below the 44.8 million pound minimum stock size threshold (MSST), the stock is considered overfished. In 2004, the TMB of red king crabs in Bristol Bay was estimated to be 176.4 million pounds, which is well above the maximum sustained yield (MSY) value of 89.6 million pounds TMB and is essentially unchanged from the 2003 estimate of 178.1 million pounds which was the highest TMB estimate since 1981.

The state harvest strategy for Bristol Bay red king crabs establishes three thresholds that must be met prior to a fishery opening. The first is a threshold abundance level of 8.4 million mature females, the second is an ESB threshold of 14.5 million pounds, and the third is a minimum GHL threshold of 4.0 million pounds. LBA estimates for 2004 show the stock to be above both the mature female abundance threshold at 35.35 million females and the ESB threshold at 61.87 million pounds of ESB. Mature female abundance and ESB increased from the 2003 levels and the estimates are the largest since the early 1980s.

Legal male abundance increased only slightly over the 2003 level. At 10.4 million crabs, the legal male abundance estimate in 2004 is the largest since 1980. Strong recruitment experienced in 2003 resulted in a slightly lower average weight and average crab size during the 2003 fishery. Recruitment to the legal size class slowed in 2004 as evidenced by the increase in average size of crabs landed during the 2004 commerical fishery.

Given recent population trends, recruitment to the mature-size male class is expected in 2005, however, the mode that has contributed to increases in mature female abundance in 2003 and 2004 is fully recruited to the mature-size female class. No additional recruitment, or perhaps a slight decrease in mature female abundance is expected in 2005.

Size frequency distribution for 2004 shows a mode of juvenile male and female red king crab centered at just under 70 mm carapace length. If these juveniles continue to remain in the population, they will begin recruiting to the mature size class in 2006 (NPFMC 2004).

In light of the most recent stock assesment and fishery performance information, it is likely that fishery thresholds will be met and the stock will be above MSST in 2005.

KING CRAB REGISTRATION AREA Q BERING SEA

DESCRIPTION OF AREA

The Bering Sea king crab Registration Area Q has as its southern boundary a line from 54° 36' N lat., 168° W long., to 54° 36' N lat., 171° W long., to 55° 30' N lat., 171° W. long., to 55° 30' N lat., 173° 30' E long., as its northern boundary the latitude of Point Hope (68° 21' N lat.), as its eastern boundary a line from 54° 36' N lat., 168° W long., to 58° 39' N lat., 168° W long., to Cape Newenham (58° 39' N lat.), and as its western boundary the United States-Russia Maritime Boundary Line of 1991 (Figure 2-5). Area Q is divided into the Pribilof District, which includes waters south of Cape Newenham, and the Northern District, which incorporates all waters north of Cape Newenham. The Northern District is subdivided into three sections: the Saint Matthew Island Section, which includes waters north of Cape Newenham and south of Cape Romanzof; the Norton Sound Section, which includes all waters north of Cape Romanzof, south of Cape Prince of Wales, and east of 168° W long; and the Saint Lawrence Island Section, which encompasses all remaining waters of the district. Registration Area Q includes waters of both the Territorial Sea (0-3 nautical miles from shore) and the Exclusive Economic Zone (3-200 miles from shore).

PRIBILOF DISTRICT RED AND BLUE KING CRAB

Historic Background

The king crab fishery in the Pribilof District began in 1973, when vessels targeted blue king crabs *Paralithodes platypus* in the vicinity of Saint George and Saint Paul Islands. The first reported catch in this area was 1.3 million pounds taken by eight vessels between July 1973 and October 1974 (Table 2-9). The average weight of crabs harvested was 7.3 pounds and CPUE was 26 legal crabs per pot lift. By the 1980/1981 season, fishing effort had increased to 110 vessels, that harvested 11.0 million pounds, the highest catch on record. However, by that time the fishery CPUE had dropped to nine legal crabs per pot lift and continued declining to a low of two crabs per pot by the end of the 1986/1987 season. Consequently, the harvest dropped to 260,000 pounds, taken by 16 vessels during the 1986/1987 season. Due to this six-year decline in harvest and concurrently low annual population estimate, the blue king crab fishery was closed beginning with the 1988/1989 season and remained closed until 1995 (Figure 2-6).

In 1993, the BOF adopted regulations that set pot limits based on overall vessel length for all king crab fisheries in the Bering Sea. In the Pribilof District, pot limits were established at 50 for vessels over 125 feet overall length and at 40 for vessels 125 feet overall length or less.

The 1993 NMFS summer trawl survey of the Bering Sea indicated a marked increase in the abundance of red king crabs around the Pribilof Islands. Although no regulatory harvest strategy with biological reference points was established for Pribilof District red king crabs, survey results indicated that a harvestable surplus of legal-sized male crabs was available. Consequently, a red king crab fishery in the Pribilof District opened for the first time in September 1993. A harvest of 2.6 million pounds was taken from a GHL of 3.4 million pounds. In 1994, the Pribilof District was again opened to the commercial harvest of red king crabs, and 104 vessels harvested 1.3 million pounds.

In 1995, an increase in blue king crab abundance and a continued harvestable surplus of red king crabs resulted in a combined red and blue king crab GHL of 2.5 million pounds. Subsequent declines in red and blue king crab abundance over the next three years resulted in a combined GHL for 1998 of 1.3 million pounds (Table 2-10). Poor fishery performance during those seasons resulted in annual harvests below the fishery GHL. From 1999 to 2003, blue king crab abundance continued to decline and the Pribilof fishery was not opened.

Since 1993, fishery openings have ranged from six to 14 days (Table 2-10). This compares to the eight-year period from 1980-1988 when fishery openings ranged from 10 to 86 days. Due to shorter seasons, the Pribilof District fishery has been managed inseason using voluntary catch reports from fishing vessels. Reports are received up to twice per day and are used to calculate CPUE, effort, and daily harvest. Inseason management of the fishery allows the department to base management decisions on real-time fishery performance and to respond to changes in catch rates caused by weather, crab abundance, and effort.

The economic value of the Pribilof District red king crab fishery peaked at $13.0 million in 1993 with an exvessel price of $4.98 per pound, the second highest on record. The value of the Pribilof District blue king crab fishery peaked at $13.6 million in 1981/1982, with an exvessel price of $1.50 per pound. Since 1995, the exvessel price of red or blue king crabs has not exceeded $3.37 per pound. Total value for the combined red and blue king crab fishery declined from $6.8 million in 1995 to $2.4 million in 1998 (Table 2-10, Figure 2-7).

ADF&G conducted a pot survey targeting red and blue king crab in the Pribilof District in 2003. The objectives of the survey were to determine the distribution and relative abundance of red and blue king crab in the District and to conduct cost-recovery fishing to cover the costs of the survey and related expenses. A total of 696 pots were pulled during the survey with an overall legal male red and blue king crab CPUE of less than one crab per pot lift. An additional 202 pots were pulled as part of the cost-recovery effort. Only 146 legal male red king crab were caught and sold for cost-recovery from the Pribilof District, thus the chartered vessel was directed to Registration Area T for the remainder of the cost-recovery efforts. Results of that pot survey suggest that the highest catches of blue king crabs occurred at stations with low red king crab catches and stations with high red king crab catches had low blue king crab catches. Distribution of red and blue king crabs in the Pribilof District is patchy and stations with high blue king crab catches were interspersed among stations showing greater red king crab abundance.

2004 Fishery

The blue king crab fishery in the Pribilof District was not opened in 2004 due to the continued decline in blue king crab abundance. The stock remains below the threshold level of abundance required for a fishery opening. Due to significant uncertainty surrounding estimated red king crab abundance and concerns for blue king crab bycatch in a directed red king crab fishery, the red king crab fishery also remained closed for the 2004 season.

Stock Status

The 2004 population estimates of blue king crabs in the Pribilof District are the lowest on record. The area-swept legal (≥ 135 mm CL) male abundance was estimated to be 0.017 million crabs in 2004, a decrease from the 2003 estimate of 0.2 million crabs. The pre-recruit (110-134 mm CL) male abundance estimate remained at less than 0.1 million crabs and large (≥ 90 mm CL) female abundance decreased from 1.1 to 0.09 million crabs. Total mature blue king crab biomass in the Pribilof District was estimated to be 0.5 million pounds in 2004, or approximately one eighth of the 2003 estimate. Since TMB remains below the MSST level of 6.6 million pounds, the stock remains overfished. ADF&G catch survey estimates of blue king crab abundance in the Pribilof District are greater than the NMFS area-swept estimates, but show continued decline through 2004 and are the lowest on record. Overall, the population abundance remains low and there appears to be little or no recruitment. Total mature biomass was below the 13.2 million pound threshold required for opening in 2004, thus the fishery will not open in 2005.

The abundance index for large female red king crabs in the Pribilof District decreased from 1.1 to 0.56 million crabs in 2004. The 2004 mature female abundance estimate is similar to the 2003 estimate of 0.4

million crabs. All mature male red king crab captured during the NMFS area-swept survey of the Pribilof District were post-recruit, legal males, indicating that little or no recruitment to the legal-size class can be expected in the near future. Legal male red king crab abundance decreased from 1.3 million crabs in 2003 to 0.8 million crabs in 2004. Estimated TMB has declined from 25.5 million pounds in 2001 to 9.9 million pounds in 2004.

In general, estimates of red king crab abundance in the Pribilof District are considered imprecise. In 2004, the majority of male red king crab were caught in a single trawl tow made just southwest of Saint Paul Island. The imprecision of red king crab abundance estimates in the Pribilof District coupled with the potential for blue king crab bycatch in a red king crab fishery, the lack of a formal harvest strategy for red king crabs and poor performance of prior fisheries has contributed to the continued closure of the fishery despite recent increases in legal male abundance (NPFMC 2004).

The Pribilof blue king crab stock was declared overfished in September of 2002, and the department developed a rebuilding harvest strategy as part of a comprehensive rebuilding plan for the blue king crab stock (Zheng and Pengilly 2003). The BOF selected a harvest strategy that includes a 10% harvest rate on mature males and a 500,000 pound minimum GHL.

SAINT MATHEW ISLAND SECTION BLUE KING CRAB

Historic Background

The commercial blue king crab fishery in the Saint Matthew Island Section of the Northern District was first prosecuted in 1977, resulting in a commercial harvest of 1.2 million pounds (Table 2-11). In 1978, the catch increased to almost 2.0 million pounds. Catches decreased in 1979 and 1980 due to lack of fishing effort. In 1981, several vessels returned to the Saint Matthew Island Section during the Norton Sound Section fishery. Catches were strong, and after the Norton Sound Section closed, additional vessels moved into the Saint Matthew Section, taking 4.6 million pounds of blue king crabs. Catch and effort increased to a peak harvest of 9.5 million pounds in 1983 when 164 vessels participated. In subsequent seasons, catches remained at or below 4.7 million pounds (Figure 2-8).

NMFS trawl surveys from 1983 to 1998 in the Saint Matthew Island indicated a harvestable surplus of blue king crabs ranging from 1.7 to 8.0 million pounds. In 1998, the legal male abundance decreased by 21%, resulting in a GHL of 4.0 million pounds. The 1998 season closed before the GHL was attained due to poor fishery performance and observer information indicating a relatively high incidental capture rate of sublegal males and female crabs. The 1998 legal male CPUE was seven crabs per pot lift, the second lowest CPUE on record. The 1998 season, which was managed based on inseason catch reports, lasted 11 days, the longest since a 17-day opening that occurred in 1983 (Table 2-12), when 9.5 million pounds were harvested. The actual harvest of 2.9 million pounds equaled the harvest projected from inseason catch reports (Table 2-13). From 1999 to 2003, abundance estimates for the Saint Matthew blue king crab stock were low and the fishery remained closed because harvest strategy abundance thresholds were not met.

In 1993, BOF adopted regulation changes and moved the opening date of the Saint Matthew king crab fishery from September 1 to September 15 (Table 2-14), concurrent with the king crab fishery in the Pribilof District. This action was taken to improve effort distribution between the Pribilof and Saint Matthew areas, thereby reducing the number of vessels participating in each fishery. Differential pot limits, established in 1993 for the Saint Matthew Island Section, limited vessels over 125 in feet overall length to 75 pots and vessels 125 feet in overall length or less to a maximum of 60 pots.

The exvessel price for Saint Matthew blue king crab during the last open season, 1998, averaged $1.87 per pound, the lowest on record since 1984 and 1985, when fishers received $1.75 and $1.60 per pound, respectively. Total value for this fishery peaked in 1983 at $25.8 million, and since 1994, has not been higher than $15.0 million (Table 2-12). In contrast, the number of vessels participating has generally increased, from 87 in 1994 to 131 in 1998 (Figure 2-9). Average weight per crab has ranged from 4.0 to

5.0 pounds, depending on the percentage of recruits entering the fishery each year. The average weight per crab during the last fishery (1998), was 4.7 pounds (Table 2-11).

2004 Fishery

The 2004 Saint Matthew Island Section blue king crab fishery remained closed because the GHL calculated from the harvest strategy was below the minimum GHL threshold specified in regulation.

Stock Status

Based on the 2004 NMFS survey, the abundance index for legal male blue king crabs remained stable at 0.7 million crabs. Abundance of pre-recruit male blue king crabs decreased from 0.3 million crabs in 2003 to 0.2 million in 2004. Large female blue king crab abundance decreased from 0.8 million crabs in 2003 to 0.2 million in 2004 (NPFMC 2004). Total mature biomass for the Saint Matthew Island blue king crab stock decreased from the 2003 level from 12.8 million pounds to 7.3 million pounds, which is below the MSST threshold of 11.0 million pounds. The stock was above MSST for the first time in the last five years in 2003, but has been considered overfished for the last six years. The 2003 TMB estimate should be viewed with caution due to the low precision in estimating this stock. Female blue king crab can be particularly difficult to capture during the trawl survey resulting in highly variable estimates from one year to the next.

A rebuilding plan was adopted for this stock in 2000 (NPFMC 2000). Stocks listed as overfished are not deemed rebuilt until TMB increases to or above the maximum sustainable yield biomass, which is twice the MSST, or 22.0 million-pounds TMB for the Saint Matthew Island blue king crab stock. Based on the 2004 survey results, the TMB would have to triple for the stock to be considered rebuilt. Survey data do not indicate that this level of rebuilding is likely in the near future; however, population estimates made from 1999 to 2004 indicate a weak positive trend in TMB (NPFMC 2004).

PRIBILOF DISTRICT GOLDEN KING CRAB

Historic Background

Golden king crabs *Lithodes aequispina* are found in commercial concentrations in only a few deep canyons in the Bering Sea District and have never sustained large harvests when compared to other Bering Sea king crab fisheries. As with many other crab fisheries in the Bering Sea, the fishery for golden king crabs was pioneered by foreign fishing fleets. A domestic fishery developed during the 1982/83 season after BOF directed ADF&G to regulate fishing for golden king crabs in the Pribilof District by emergency order (ADF&G 1984). By the 1984 season, BOF directed ADF&G to manage the Area Q golden king crab fishery under authority of a commissioner’s permit that allowed the fishery to develop and expand into new areas (ADF&G 1985).

The first domestic harvest of golden king crabs in the Bering Sea occurred in June of 1982 when two vessels fished in the Pribilof District (Table 2-15). Effort increased to 10 vessels during the following season with a harvest of nearly 70,000 pounds. The size limit for golden king crabs in the Pribilof District was reduced from six and one-half inches to five and one-half inches in 1983. Subsequently, effort in the Pribilof District peaked during the 1983/84 season when 50 vessels harvested 860,000 pounds of golden king crabs. From 1984 to 1992, no more than two vessels participated each year in the fishery. Since the 1983/84 season, harvest has not exceeded 350,000 pounds annually. The Pribilof District golden king crab fishery reached a maximum exvessel value of just over $1 million in 1995 and the highest price fishers received per pound was $3.81 in 1994 (Table 2-16). During the last nine years in the Pribilof District fishery an average of five vessels have annually harvested an average of 166,000 pounds. CPUE has averaged seven legal crabs per pot lift with an average weight of 4.0 pounds. Most harvest in the Pribilof District has occurred in the area immediately to the south of the Pribilof Islands.

At its March 1993 meeting, BOF developed pot limits for all king crab fisheries in the Bering Sea. Current pot limits in the Pribilof District are set at 40 pots for vessels 125 feet or less in length and 50 pots for vessels greater than 125 feet in length.

In 2000, the Pribilof District golden king crab fishery opened with a GHL of 150,000 pounds, which was 50,000 pounds less than the 1999 harvest level. This adjustment better complies with guidelines outlined in the FMP for the king and Tanner crab fisheries of the Bering Sea and Aleutian Islands and is based on the average harvest from 1983 to 1997. Seven vessels harvested 127,000 pounds in 2000. The GHL was not reached; thus, the fishery remained open until the end of the year. In 2001, six vessels harvested 146,000 pounds and the fishery was closed by emergency order.

The golden king crab fishery in the Bering Sea is managed using inseason catch reports provided by processors and observers. Fishing is restricted to depths of 100 fathoms or greater. Starting in 2001, 100% observer coverage was required for each vessel registered for the fishery to provide fishery and biological data that has not previously been available. In addition, vessel logbooks issued with the commissioner's permit provide location of fishing operations, effort, and estimates of bycatch. Primary bycatch species include non-retained golden king crabs, Pacific halibut *Hippoglossus stenolepis*, Pacific cod *Gadus macrocephalus* and, snow crabs *Chionoecetes opilio*.

The 2002 fishery opened January 1 with a GHL of 150,000 pounds, and closed by emergency order on May 14. The total harvest was 150,434 pounds. CPUE averaged six legal crabs per pot lift, a decrease from the CPUE of eight legal crabs per pot during the 2001 fishery. Landed crabs averaged 4.3 pounds per crab, the same as the 2001 season. The 2002 Pribilof District golden king crab fishery had a total fishery value of $438,000, which was just $9,000 more than the 2001 fishery value.

The 2003 Pribilof District golden king crab fishery opened on January 1 with a GHL of 150,000 pounds. Three vessels registered for the fishery and began fishing in late March. A fourth vessel registered in April but did not fish. Because only two processors participated in the fishery, most harvest information is confidential. The majority of the harvest in 2003 occurred south of Saint George Island.

2004 Fishery

Five vessels registered for the 2004 Pribilof District golden king crab fishery. Fishing effort began in late February and the fishery was closed by emergency order on March 12. Most of the 2004 harvest information is confidential because only three processors purchased the harvest. Catch rates during the 2004 fishery were among the highest on record, and the fishery was the shortest ever at approximately three weeks in duration. Most of the 2004 harvest occurred immediately to the south of Saint George Island in the vicinity of the Pribilof Canyon.

Stock Status

The golden king crab population in the Pribilof District is not surveyed and no estimate of abundance has been made. There are no plans to survey this population, nor has a formal harvest strategy been developed. Population size is believed to be limited by the amount of available habitat in the Pribilof District. The fishery is currently managed using a GHL set from the long-term average harvest. Data collected by onboard observers in conjunction with data from the landed catch are used to annually evaluate the status of the stock. Since 2002, the average size of legal male golden king crab taken during the commercial fishery has decreased while CPUE has increased suggesting that above average recruitment to the legal male portion of the stock has recently occurred.

NORTHERN DISTRICT GOLDEN KING CRAB

Historic Background

A domestic fishery for golden king crabs in the Saint Matthew Island Section of the Northern District also began in the 1982/83 season. Effort and harvest in the Northern District has been sporadic. Since the initial fishery, harvest has only been documented during ten seasons. Harvest peaked during the 1987 season when 11 vessels harvested over 424,000 pounds (Table 2-17). Since 1988, no more than four vessels have participated during any season. The majority of the golden king crab harvest in the Northern District has occurred west of Saint Matthew Island. There has been no documented harvest of golden king crabs from either the Saint Lawrence Island or Norton Sound Sections.

At its March 1993 meeting, BOF developed pot limits for all king crab fisheries in the Bering Sea. Current pot limits in the Northern District are set at 60 pots for vessels 125 feet or less in length and 75 pots for vessels greater than 125 feet in length. These pot limits are significantly lower than the average number of pots fished per vessel in the Aleutian Islands golden king crab fishery, which has no pot limits in place. The Northern District fishery has never been closed by emergency order (Table 2-18).

The golden king crab fishery in the Bering Sea is managed using inseason catch reports provided by processors and observers. Starting in 2001, 100% observer coverage was required for each vessel registered for the fishery in order to provide fishery and biological data that has not previously been available. In addition, vessel logbooks issued with the commissioner's permit provide location of fishing operations, effort, and estimates of bycatch. Primary bycatch species include sublegal male and female golden king crabs, Pacific halibut, Pacific cod, and snow crabs. Fishing is also restricted to depths of 100 fathoms or greater.

2004 Fishery

The fishery opened January 1 with a GHL of 10,000 to 20,000 pounds and closed December 31, 2004. No vessels registered to fish for golden king crabs in the Northern District of Area Q in 2004 and there was no commercial harvest.

Stock Status

The golden king crab population in the Northern District is not surveyed and no estimate of abundance has been made. There are no plans to survey this population, nor has a formal harvest strategy been developed. Population size is believed to be limited by the amount of available habitat in the Northern District. The current GHL of 10,000 to 20,000 pounds is designed to allow for some exploratory fishing and data gathering.

BERING SEA SCARLET KING CRAB

Historic Background

Scarlet king crabs *Lithodes couesi* are harvested under authority of a permit issued by the commissioner of ADF&G authorized in 5 AAC 34.082 PERMITS FOR LITHODES COUESI KING CRAB. Harvest of scarlet king crabs in the Bering Sea has primarily occurred as incidental harvest in the grooved Tanner crab *Chionoecetes tanneri* and golden king crab fisheries. Although vessels first registered to fish for Bering Sea scarlet king crabs in 1992, no commercial landings occurred prior to 1995. In 1995, four vessels harvested 26,684 pounds (Table 2-19) and were paid an exvessel price of \$2.12 per pound. Only two vessels participated in 1996, consequently all catch information is confidential. No vessels registered to fish for scarlet king crabs from 1997 to 1999. A single vessel was permitted to retain scarlet king crabs as incidental harvest during the grooved Tanner crab fishery in 2000 and 2001. Since less than three vessels participated, the harvest information is confidential. Scarlet king crab incidental harvest was permitted at a rate of 50% of the weight of the target species. No vessels registered to retain incidental catch of scarlet king crab in 2002. Three vessels registered to retain scarlet king crabs as incidental harvest during the 2003 Bering Sea golden king and deep-water Tanner crab fisheries. Due to the limited amount of participation in the fishery all harvest information is confidential.

2004 Fishery

Three vessels registered to retain scarlet king crabs as incidental harvest during the 2004 Bering Sea golden king and deep-water Tanner crab fisheries. Due to the limited amount of participation in the fishery all harvest information is confidential.

Fishery Management and Stock Status

No annual abundance estimates are available for scarlet king crab stocks, nor have any stock assessment surveys been conducted. Onboard observers have been required on most vessels targeting deepwater crab species since 1994 and have collected information detailing the size and sex composition of the retained and non-retained scarlet king crab and bycatch species. This information will be used to help develop management measures for these deepwater crab stocks. Currently, ADF&G does not register vessels to fish directly for scarlet king crabs in the Bering Sea because stock size appears low and not capable of supporting a directed fishery. Retention of scarlet king crabs captured in other deepwater crab fisheries will be permitted at low levels.

BERING SEA TANNER CRAB MANAGEMENT DISTRICT

DESCRIPTION OF AREA

The Bering Sea District of Tanner crab Registration Area J includes all waters of the Bering Sea north of Cape Sarichef at 54° 36’ N lat. and east of the U.S.-Russia Maritime Boundary Line of 1991. This district is divided into the Eastern and Western Subdistricts at 173° W long. The Eastern Subdistrict is further divided at the latitude of Cape Romanzof and 168° W long. into the Norton Sound Section to the east and the General Section to the south and west (Figure 2-10).

BERING SEA TANNER CRAB

Historic Background

The first reported U.S. harvest of Tanner crabs *Chionoecetes bairdi* occurred in 1968, incidental to the harvest of red king crabs in Bristol Bay. In 1974, a directed Tanner crab fishery began. Harvest peaked at 66.6 million pounds during the 1977/78 season (Table 2-20). In the fall of 1978, NMFS predicted sharp declines in Tanner crab abundance beginning with the 1978/79 fishing season. As anticipated, Tanner crab stocks declined and by 1984 the commercial harvest fell to 1.2 million pounds (Figure 2-11). Further stock declines led to a fishery closure during the 1986 and 1987 seasons.

In 1992, in an effort to slow the harvest rate in order to provide sufficient time for inseason management of the Tanner crab fishery, the BOF adopted regulations which restricted all participating vessels to fishing a maximum of 250 pots. In 1993, in order to comply with federal law regarding application of pot limits in a nondiscriminatory manner, differential pot limits based on vessel length were implemented. Vessels 125 feet or under in overall length were limited to a maximum of 200 pots, while vessels longer than 125 feet in overall length were limited to a maximum of 250 pots.

Also in 1993, BOF adopted regulations that opened and closed that portion of the Eastern Subdistrict east of 168° W long., to Tanner crab fishing concurrent with the regulatory opening and emergency order closure of the Bristol Bay red king crab fishery. If sufficient GHL remained to be taken, the BOF mandated a reopening of the Eastern Subdistrict between 163° and 173° W long. for the directed Tanner crab fishery 10 days after the closure of the Bristol Bay red king crab fishery. In the event the Bristol Bay red king crab fishery failed to open, the portion of the Eastern Subdistrict west of 163° W long. would open to a directed Tanner crab fishery on November 1. These BOF actions were based on observer bycatch data and historic harvest patterns indicating that the majority of female king crab bycatch in the Bristol Bay red king crab and Bering Sea Tanner crab fisheries came from waters east of 163° W long.

During the 1994 and 1995 seasons, the Bristol Bay red king crab fishery did not open due to low stock abundance. As a result, the Tanner crab fishery opened on November 1 in the Eastern Subdistrict west of 163° W long. The commercial Tanner crab harvest in 1994 was 7.8 million pounds; in 1995 the harvest declined to 4.2 million pounds (Table 2-21).

The GHL for the 1996 Tanner crab fishery was 8.4 million pounds (Table 2-22). Due to poor fishery performance, the fishery was closed before the GHL was reached; a total of 1.8 million pounds was harvested. The average size of crabs harvested in 1996 was 152 mm carapace width (CW). This compares to an average of 149 mm CW observed in 1995. The percentage of new-shell crabs harvested in 1996 decreased to 47% from 59% observed in the 1995 harvest (Table 2-23).

Based on poor fishery performance in 1996 and results from the 1997 NMFS survey indicating significant declines in most segments of the Tanner crab population (Stevens et al. 1998a), the Bering Sea Tanner crab fishery remained closed for the 1997 season. The 1998 NMFS survey indicated further declines in Tanner crab abundance and the fishery did not open in 1998. Abundance of large male and female Tanner crabs continued to decline to the lowest level in the history of the survey (Stevens et al. 1998b). Because the stock fell below the MSST established in the FMP for this fishery, the stock was declared overfished by NMFS in 1998, necessitating a rebuilding plan.

At the March 1999 BOF meeting, a revised harvest strategy was adopted as part of a comprehensive Bering Sea Tanner crab rebuilding plan. The harvest strategy for the Eastern Subdistrict specifies a threshold of 21.0 million pounds of mature female biomass that, for management purposes, are females ≥ 80 mm CW. No directed crab fishery is prosecuted when female biomass is below that threshold. When the mature female biomass is between 21.0 million and 45.0 million pounds, a maximum harvest rate of 10% is applied to “molting mature males”, or those mature male crabs likely to continue to grow, defined as 100% of new-shell and 15% of old-shell males greater than 112 mm CW. When the mature female biomass is above 45.0 million pounds the harvest rate is set at a maximum of 20% of molting mature males.

When establishing a GHL, no more than 50% of the exploitable legal-size male abundance may be harvested. Exploitable legal-size male abundance is 100% of new shell and 32% of old-shell male crabs greater than 140 mm CW. Separate GHLs are calculated for the areas east and west of 168° W long. The minimum fishery threshold is 4.0 million pounds. If the fishery is not opened because it did not meet threshold requirements, the fishery may reopen the following season if a GHL of at least 8.0 million pounds is calculated through the harvest strategy, but only half of the GHL may be taken that year. If the fishery remains closed because the GHL is calculated to be greater than 4.0 million pounds, but less than 8.0 million pounds, the fishery may reopen the following year if the calculated GHL is at least 4.0 million pounds. This safeguard was established to protect against survey bias in the year following a closure due to low stock abundance.

Pre-recruit crab abundance began increasing in 1998 and 1999, but this trend reversed in 2000 and 2001. In addition, the stock remained below fishery threshold level established in the harvest strategy and the fishery was closed from 1999 to 2003.

2004 Fishery

Harvest strategy thresholds were not met in 2004. Consequently, the Bering Sea Tanner crab fishery remained closed for the 2004 season.

Stock Status

The abundance of Tanner crabs in the Bering Sea District remains below levels to allow for a fishery, but the stock demonstrates increasing trends in total mature biomass.

Based on area-swept calculations made by ADF&G, the estimated abundance of molting mature males increased 51% over the 2003 level to 15.6 million crabs. Molting mature male abundance has more than doubled since 2002. The 2004 estimate for mature female abundance was 39% lower than in 2003. The 2004 legal male abundance estimate was 5.5 million crabs, a 27% decrease from the 2003 level. The 2004 Bering Sea Tanner crab mature female biomass estimate made by ADF&G using area-swept calculations was 13.2 million pounds and the fishery was not opened because the harvest strategy threshold of 21 million pounds of mature female biomass was not met.

The Bering Sea Tanner crab estimated spawning biomass decreased from 100.8 million pounds in 2003 to 86.8 million pounds in 2004. Despite the decrease, the 2004 spawning biomass estimate was the second largest since 1997. In 2004, the stock decreased below MSST (94.8 million pounds of spawning biomass). Despite recent upward trends in spawning biomass, molting mature male abundance and legal male abundance, the stock remains well below the rebuilt level of 189.6 million pounds of spawning biomass and is not likely to reach that level in 2005 (NPFMC 2004).

BERING SEA SNOW CRAB

Historic Background

The first commercial landings of snow crabs *Chionoecetes opilio* from the Bering Sea were recorded in 1977, incidental to the harvest of Tanner crabs. In 1981, a reduction in the Tanner crab harvest resulted in increased snow crab harvest. The harvest of snow crabs fell from 52.8 million pounds in 1981 to 26.1 million by 1983 (Table 2-24, Figure 2-12). In 1984, harvest increased slightly, and in 1985, 66 million pounds were landed. In 1986, the harvest increased to 98.0 million pounds. The commercial catch continued to increase annually to a high of 328.6 million pounds in 1991. Although stocks began to decline, the harvest of snow crabs remained over 100 million pounds through the 1994 season. In 1996, the harvest declined to 65.7 million pounds, the lowest in the preceding eleven seasons. The GHL more than doubled in 1997 to 117.0 million pounds and the fleet harvested 119.5 million pounds. In the 1998 general fishery, 229 vessels harvested 243.3 million pounds.

The NMFS stock assessment survey in 1998 indicated that the estimate of large male snow crabs declined by 17% from the prior year's survey, resulting in a general fishery GHL of 186.2 million pounds. Two hundred and forty one vessels landed 184.5 million pounds during the 1999 general fishery, ending on March 22.

In 1999, the surveyed stock was 60% of the minimum stock size threshold, defined as half the long term average mature biomass established in the FMP for Bering Sea and Aleutian Islands king and Tanner Crab (NPFMC 1998). In response to significant stock declines, ADF&G initially reduced the 58% exploitation rate on 102 mm CW and larger male snow crabs by 50%. The revised 29% exploitation rate would still have resulted in a removal rate from the estimated mature biomass close to the long-term average. Thus, in accordance with NMFS guidelines for stock rebuilding, the harvest rate was reduced by an additional 25% to 22%, which also took into consideration handling mortality during the fishery and high natural mortality during the six month hiatus between the survey and the fishery opening. This reduction in exploitation rate resulted in a GHL of 28.5 million pounds for the 2000 season.

The 2000 snow crab fishery was scheduled to open by regulation at noon on January 15. However, by early January, a significant portion of the fishing grounds were ice covered. The ADF&G and industry had concerns about potential gear conflicts and gear loss due to sea ice and vessel interactions because of the limited fishing area. ADF&G was also concerned with the handling effects and the potential for increased handling mortality and limb loss of captured crabs in a derby-style fishery under extreme weather conditions. ADF&G received input from representatives of the crab industry and the majority indicated a desire to delay the season. The USCG was also in favor of delaying the season due to vessel safety concerns during severe vessel icing conditions. On January 7, ADF&G announced by news release that the fishery would be delayed and would not open prior to April 1, and that two weeks advance notice would be provided to industry prior to an opening. On March 7, ADF&G issued a news release defining criteria that would be used to open the fishery. These criteria, developed with input from industry, specified that at least 50% of the fishing grounds had to be ice free at the time of the opening, and that the ice edge at 167° W long. could be no further south than 58° N lat. On March 15, ADF&G issued a news release indicating opening criteria had been met and that the fishery would open at noon on April 1.

The 2000 general fishery opened at noon on April 1 and closed at noon on April 8 (Table 2-25). Due to the relatively small GHL, management of the 2000 fishery was based on daily inseason reports from fishers.

Harvest from the Eastern Subdistrict was 20.9 million pounds from 217 landings (Table 7), or 68% of the total harvest. In recent years the majority of the harvest had occurred in the Eastern Subdistrict. Total harvest from the Western Subdistrict was 9.8 million pounds from 91 landings. The majority of the Eastern Subdistrict harvest came from six statistical areas surrounding the Pribilof Islands. The majority of the harvest in the Western Subdistrict came from four statistical areas along the 100 fathom depth contour, between 173° and 174° W long. In both subdistricts the majority of the harvest came from areas which have, in recent years, contributed the majority of the harvest.

The exvessel price for snow crabs harvested in the 2000 fishery was two-tiered due to concerns for higher than normal old-shell crabs expected in the catch. Fishers were offered $1.85 per pound for new-shell crabs and $1.00 per pound for old-shell crabs. Fishers reported encountering high percentages of old-shell crabs in the first two days of the fishery, but thereafter located areas, which contained predominantly new-shell animals. As a result, less than 10% of crabs landed were old-shell animals. Based on an average exvessel price of $1.81 per pound, the 2000 snow crab fishery was worth $55.1 million. This compares to an exvessel price of $0.88 per pound and an overall fishery value in excess of $161 million in 1999.

Analysis of the 2000 National Marine Fisheries Service summer trawl survey of the Eastern Bering Sea indicated a 19% decrease in the abundance of large (≥ 102 mm CW) male crabs from the 1999 survey. However, small (< 102 mm CW) male and large (≥ 50 mm CW) female abundance increased 100% and 212%, respectively. Due to the large increase in both small male and large female abundance, the spawning biomass, estimated at 472.7 million pounds, was slightly above the minimum stock size threshold of 460.8 million pounds.

In the spring of 2000, the BOF adopted a harvest strategy specifying a stepped harvest rate on mature male crabs that is dependant on estimated spawning biomass and that would rebuild the stock. At that time, the rebuilding plan specified an exploitation rate of 16.875% of the mature male biomass when the spawning biomass is between 460.8 and 921.6 million pounds, resulting in a GHL for the 2001 season of 27.3 million pounds with 25.3 available to the general fishery and 2.0 million pounds allocated to the CDQ fishery.

The 2001 Bering Sea snow crab general fishery opened by regulation at noon on January 15 and closed by emergency order at 11:59 PM on February 14. The fleet harvested 23,382,046 pounds, or 92% of the GHL. A total of 207 vessels, including 7 catcher-processors participated in the 2001 fishery. Because of lengthy price negotiations, most catcher vessels did not begin fishing until 4:00 PM on February 3. As a result, harvest for the first 18 days of the season, 2.2 million pounds, was taken almost entirely by catcher-processor vessels.

The average exvessel price per pound in 2001 was $1.53, resulting in a total fishery value of $32.1 million, a significant decrease from the 2000 fishery value of $55.1 million.

Weather conditions in the Bering Sea throughout the 2001 fishery were very unfavorable. Several storms, some generating hurricane force winds, combined with large tides to produce extremely dangerous sea conditions. Several vessels lost wheelhouse windows and experienced other structural damaged caused by large waves. No vessels or lives were lost during the 2001 fishery. Sea ice was not a major concern in 2001, and the main ice pack remained north of Saint Matthew Island throughout the fishery.

The 2001 NMFS trawl survey of the Eastern Bering Sea indicated a 2% increase in the abundance of large male crabs when compared to the 2000 survey. Pre-recruit male and large female abundance increased 114% and 3%, respectively. The total mature biomass of snow crab in the Bering Sea was estimated to be 571.0 million pounds which was above the minimum stock size threshold of 460.8 million pounds.

Given the estimated total mature biomass of 571.0 million pounds and current harvest strategy requirements, the GHL was set using a 16.875% exploitation rate. The calculated GHL of 51.0 million pounds constituted a harvest greater than 50% of the estimated exploitable legal male abundance and thus, according to harvest strategy requirements was adjusted down to not exceed 50% of the exploitable legal male abundance. The resultant 2002 Bering Sea snow crab GHL was 30.8 million pounds with 28.5 million pounds available to the general fishery. The remaining 2.31 million pounds were allocated to the CDQ fishery. Approximately 61% of the four inch and greater carapace width males encountered during the 2001 survey had old shells.

The 2002 Bering Sea snow crab general fishery opened by regulation at NOON on January 15 and closed by emergency order at NOON on February 8. Total harvest by 191 vessels including eight catcher processors was 30,252,501 pounds, exceeding the general fishery GHL of 28.5 million pounds by 1.8 million pounds (6.4%).

Unlike the 2001 fishery, in 2002 the Bering Sea snow crab fleet voted to accept a price offer prior to the beginning of vessel registration on January 13. The fleet voted to accept $1.40 per pound for new-shell crabs that were four-inch and greater carapace width. As the fishery progressed, some fishers experienced difficulty in finding grounds containing a high percentage of new-shell crabs. Approximately 31% of landed crabs had old shells. As a result, processors offered a second price of $0.90 to $1.00 per pound for old-shell crabs that were four inch and greater carapace width. Given this price structure, the 2002 Bering Sea snow crab fishery had an estimated exvessel value of $44 million.

In addition to old-shell crabs that were delivered, onboard observers and fishers reported that up to 30% of legal crabs caught were being discarded at sea due to shell condition. During the 2001 fishery, approximately 20% of the legal snow crabs that were caught were not retained and 4.8% of snow crabs landed had old shells.

Due to the protracted length of the 2002 fishery, most vessels made one or two landings prior to the closure of the fishery. By the fishery closure, approximately 66% of the harvest had already been processed, reducing post season processing delays experienced in 2001. Processing was completed by February 17. Two processors operating under sideboards of the AFA were constrained by their processing caps; none were constrained in 2001.

Weather conditions in the Bering Sea during the 2002 fishery did not significantly hamper the fleet, however heavy freezing spray slowed production in late January and early February. Like the 2001 fishery, no vessels or lives were lost in 2002. Unlike the 2001 fishery, sea ice was a significant factor throughout the season. Sea ice forced most of the fleet to remain below 59° N lat. and thus a significant portion of the stock could not be fished. In addition, sea ice forced fishers to move gear more frequently. Post season, sea ice covered some gear stored north of 56° 30' N lat.

The 2003 Bering Sea snow crab general fishery opened by regulation at noon on January 15 and closed by emergency order at 6:00 AM on January 25 with a harvest of 26.34 million pounds which exceeded the general fishery guideline harvest level (GHL) of 23.69 million pounds by 2.65 million pounds (11.2%).

The 2002 National Marine Fisheries Service summer trawl survey of the Eastern Bering Sea indicated a 2% decrease in the abundance of large ($\geq$ 102 mm carapace width (cw)) male crabs when compared to the 2001 survey. Small (< 102 mm cw) male and large ($\geq$ 50 mm cw) female abundance decreased 12% and 67%, respectively. The total mature biomass of snow crab in the Bering Sea is estimated to be 313.0 million pounds which is below the minimum stock size threshold of 460.8 million pounds, and is a decrease from the 2001 TMB estimate of 571.0 million pounds.

The snow crab fleet voted to accept $1.85 per pound for new-shell crabs that were four inch and greater carapace width, a substantial increase from the 2002 price of $1.40 per pound. In contrast to 2002, the fleet did not encounter large numbers of old or very old shell crabs on the grounds resulting in an average exvessel price of $1.83 per pound and a total exvessel value of nearly $47 million, an increase from the 2002 exvessel value of $40 million.

Weather conditions in the Bering Sea during the 2003 fishery did not significantly hamper the fleet and sea ice location allowed the fleet to operate farther north and west of areas that have been recently fished. Like the prior two snow crab fisheries, no vessels or lives were lost in 2003.

2004 Fishery

The 2004 Bering Sea snow crab general fishery opened by regulation at noon on January 15 and closed by emergency order at 10:00 PM on January 23. Fish ticket data indicate a harvest of 22.17 million pounds, exceeding the general fishery guideline harvest level (GHL) of 19.27 million pounds by 2.9 million pounds (15%).

Analysis of the 2003 National Marine Fisheries Service summer trawl survey of the Eastern Bering Sea indicated a 16% decrease in the abundance of large ($\geq$ 102 mm carapace width (cw)) male crabs when compared to the 2002 survey. The total mature biomass (TMB) of snow crab in the Bering Sea is estimated to be 306.2 million pounds which is below the minimum stock size threshold of 460.8 million pounds, and is a decrease from the 2002 TMB estimate of 313.0 million pounds.

Given the estimated total mature biomass of 306.2 million pounds and current harvest strategy requirements, the GHL was set using an 11.5% exploitation rate. The resultant 2004 Bering Sea snow crab GHL was 20.83 million pounds with 19.27 million pounds available to the general fishery. The remaining 1.56 million pounds were allocated to the CDQ fishery.

Preseason vessel registration was required by 5:00 PM on December 24, 2003. A total of 193 vessels filed preseason registrations. Eight vessels filed applications for late registration and were permitted to enter the fishery. Catcher-vessel observer coverage was assigned based on the number of catcher vessels that filed preseason registrations. Nineteen catcher vessels and six catcher processors carried observers during the 2004 Bering Sea snow crab fishery.

Based on the snow crab GHL, regulatory pot limits were 70 pots for vessels less than or equal to 125 feet in overall length and 90 pots for vessels greater than 125 feet in overall length. A total of 14,460 buoy tags were purchased by 191 vessel operators for the 2004 Bering Sea snow crab fishery. The fleet purchased 20,452 buoy tags for the 2003 fishery. The 2004 snow crab fishery is only the second during which pot limits have been lower than 200 pots for vessels less than or equal to 125 feet in overall length and 250 pots for vessels greater than 125 feet in overall length.

The quick registration process began January 7 with preseason tank inspections in Dutch Harbor, Akutan, King Cove and False Pass. The quick registration process is not used in Saint Paul, however standard tank inspections and vessel registrations are conducted in the 24 hours prior to the fishery opening. In the four other ports, the fleet was registered on January 13. The tank inspection process was also used to enlist vessel operators in the inseason catch reporting program. Over 50% of the fleet volunteered to make daily catch and effort reports.

During the week preceding vessel registration, department staff consulted with United States Coast Guard (USCG) search and rescue personnel and National Weather Service (NWS) forecasters regarding a potential weather-related delay in season opening. NWS staff did not forecast storm force winds in the operational area of vessels that would be travelling to the snow crab fishing grounds from Dutch Harbor, Akutan, King Cove, Saint Paul or False Pass, nor were storm force winds forecast for the time period January 15-17. USCG personnel did not foresee that current or forecast weather conditions would hamper a search and rescue mission immediately before or during the first 48 hours of the fishery, thus the season was not delayed.

A total of 189 vessels participated in the 2004 fishery. Three floating processors registered and purchased crabs on the grounds during and after the fishery. Six shore-based processors in Dutch Harbor, two in Saint Paul, one in King Cove and two in Kodiak also purchased and processed snow crabs. In addition, two catcher processor vessels purchased snow crabs from catcher vessels after the fishery.

The fleet spent January 15 and the early portion of the 16th deploying gear and just over 0.5 million pounds were taken by 6:00 AM January 16. By 6:00 AM January 17, the fleet had harvested nearly 3.4 million pounds and was pulling approximately 14,000 pots per day for a catch per unit of effort (CPUE) of 155 crabs per pot lift and a daily harvest rate of 2.8 million pounds. Daily harvest peaked during the 24-hour period ending at 6:00 AM January 18 when the fleet harvested just over 3.0 million pounds with a CPUE of 169 crabs per pot lift (Table 2-26).

Reports received through 6:00 AM January 22 indicated that in the prior 24 hours, the fleet harvested 2.2 million pounds and pulled approximately 14,000 pots for a CPUE of 122 crabs per pot lift and a cumulative harvest of 15.5 million pounds. Given this catch rate, the department issued a news release at 3:00 PM on January 22 announcing that the 2004 Bering Sea snow crab fishery would close at 10:00 PM January 23. Based on inseason catch reports received from approximately 40% of the fleet through January 24, the estimated total harvest for the 2004 snow crab fishery was 20.2 million pounds with an estimated effort of 111,152 pot lifts and a CPUE of 139 crabs per pot lift. Based on fish ticket data CPUE for the 2004 fishery was 157 crabs per pot lift from a total of 110,087 pot lifts. In 2003, the fleet harvested 26.3 million pounds and pulled approximately 140,000 pots for a CPUE of 155 crabs per pot lift.

In 2004, relatively little of the snow crab harvest occurred in the Eastern Subdistrict, a sharp contrast to the fisheries of the 1990s when the majority of the harvest occurred east of 173° W long. During 2004, approximately 2.8 million pounds (12%) of snow crabs were harvested east of 173° W long (Table 2-27). In 2003, 15% of the harvest occurred in the Eastern Subdistrict. Harvest distribution was limited in 2004 as it was in 2003. Nearly two thirds of the 2004 harvest occurred in four contiguous ADF&G statistical areas northwest of the Pribilof Islands (Table 2-28).

Representatives of the snow crab fleet voted to accept a price offer from processors prior to the start of tank inspections. The fleet accepted $2.05 per pound for new-shell crabs that were four inches and greater in carapace width, a substantial increase from the 2003 price of $1.85 per pound. The fleet did not encounter large numbers of old or very old shell crabs on the grounds resulting in an exvessel price of $2.05 per pound and an exvessel fishery value of nearly $45 million, a slight decrease from the 2003 exvessel fishery value of $47 million (Table 2-29).

The fleet was not significantly constrained by weather or sea ice conditions in 2004. Like the prior three snow crab fisheries, no vessels or lives were lost in 2004.

Alaska Bureau of Wildlife Enforcement (ABWE) stationed personnel in all ports where snow crabs were landed. No vessel operators were cited for illegally harvesting Tanner crabs during the snow crab fishery, however one vessel operator was cited for failing to register for the fishery.

Dockside Sampling

Snow crabs were sampled at dockside from deliveries during and after the 2004 Bering Sea snow crab general fishery. Confidential interviews were conducted with vessel captains to acquire detailed information regarding statistical areas fished, effort and fishery performance. Biological data collected consisted of average size and weight, shell condition and hybridization.

A total of 163 shoreside deliveries were made by the snow crab fleet in 2004. ADF&G observers collected biological and fishery data from 20 of those deliveries while ADF&G dockside samplers performed the same duties on 128 (90%) of the remaining non-observed shoreside deliveries. Approximately 2% of the crabs delivered in the 2004 Bering Sea snow crab general fishery were counted and weighed to derive average weight estimates. The average weight of crabs landed during the 2004 fishery is 1.3 pounds, a slight increase from the 2003 average weight of 1.2 pounds. Preliminary data does not indicate that there was a significant difference in average weight between crabs harvested in the Eastern and Western Subdistricts.

Less than 1% of the crabs delivered were measured for CW and examined for shell condition. Based on these data, 86% of the crabs measured were new shell, 13% were old shell and 1% were very old shell (Table 2-30, Figure 2-13). Average CW for Bering Sea snow crabs was 110 mm, a slight increase from 107 mm in 2003.

Stock Status

The Bering Sea snow crab stock fell below the minimum stock size threshold and was declared overfished in 1999. Since 1999, snow crab abundance in the Bering Sea has fluctuated, but has remained depressed relative to fishery management reference points.

The 2004 estimated abundance of small males decreased 3.6% from the 2003 level and large female abundance increased by 32%. Despite the increase in mature female abundance, the lack of recruitment to this portion of the stock for several years is evidenced by the high proportion of old and very old shell female crabs in the population.

Federal FMP and state harvest strategy requirements use the total mature snow crab biomass (TMB) to evaluate the stock. TMB is defined as the biomass of all the mature male and female snow crabs. In 2001, the TMB of snow crabs in the Bering Sea was estimated to be 571 million pounds, a 21% increase over the 2000 level of 473 million pounds, but well below the Federal FMP defined rebuilt level of 921.6 million pounds. In 2003, TMB decreased to 306.2 million pounds compared to 313 million pounds in 2002. The 2004 TMB estimate was 343.7 million pounds. TMB must remain above 230.4 million pounds in order for a fishery to occur.

Relative to FMP criteria, the Bering Sea snow crab stock remains below the rebuilt level. The recruitment observed in 2000 and 2001 does not appear to have contributed significantly to stock rebuilding, however it helped sustain small commercial harvests that otherwise may not have been possible. The 2004 estimated snow crab biomass is near historic lows and it is difficult to predict if TMB will be adequate to meet the harvest strategy threshold for opening the 2006 fishery, or if the minimum GHL threshold will be met.

BERING SEA GROOVED TANNER CRAB

Historic Background

In 1988, BOF established a special permit season for deepwater Tanner crabs. However, no commercial harvest of grooved Tanner crabs from the Bering Sea occurred until 1992. In 1993, ADF&G restricted the harvest to male crabs with a CW of 127 mm (5 inches) or greater. Six vessels harvested just less than 660,000 pounds. The following year, differential pot limits, based on vessel size, were applied to vessels fishing for deepwater Tanner crabs in the Bering Sea. Effort and landings consequently decreased as four vessels harvested slightly over 300,000 pounds (Table 2-31).

At the March 1995 meeting, BOF determined that pot limits should not apply to the deepwater Tanner crab permit fisheries of the Westward Region. Effort increased significantly that year when eight vessels harvested over one million pounds with a fishery value exceeding $1.3 million. Since 1995, the number of vessels registered for Bering Sea District grooved Tanner crabs has not exceeded three vessels for any year. Catch per unit effort was highest in 1994 at 11 legal crabs per pot lift and declined to three in 1996. Harvests decreased from over 1,000,000 pounds in 1995 to 107,000 pounds in 1996. No vessels registered to fish grooved Tanner crabs in the Bering Sea District from 1997 to 1999, while only one vessel registered each year in 2000 and 2001. Historically, fishing effort has been concentrated in a few statistical areas immediately south of Saint George Island.

In 1997, ADF&G set GHLs for grooved Tanner crabs that were based on prior harvest information. In the past, the Bering Sea, Alaska Peninsula, and Eastern Aleutian Districts supported the largest catches of grooved Tanner crabs. A GHL of 200,000 pounds was established for each of these districts. A GHL of 100,000 pounds was established in the Kodiak and Western Aleutian Districts to allow for exploratory fishing. Additionally, due to concerns about handling mortality on undersized and female deepwater crabs caught and released, ADF&G began to require a minimum of two escape rings per pot with a minimum inside ring diameter of 4.5 inches.

Given fishery performance and declining harvests of the mid-1990s, the department reevaluated deepwater Tanner crab harvest levels in 1999. A GHL range of 50,000 to 200,000 pounds was established for the Bering Sea District. The GHL was set as a range to provide greater flexibility for inseason management and to better inform the public of the department's management goals for the fishery. The fishery is managed so that the upper end of the GHL range is reached only when catch rates similar to or greater than those documented prior to the harvest declines of the mid 1990s are observed. In addition to new GHL requirements, the department specified that four 4.5" escape rings be placed on the lower third of each pot and required that pots be fished over multiple depth strata. Since 1994, observers have been required on each vessel registered for the fishery to collect biological and fishery data.

2004 Fishery

Two vessels registered for the directed Bering Sea grooved Tanner crab fishery in 2004. Two additional vessels registered to retain grooved Tanner crab incidentally taken during the Pribilof District golden king crab fishery, but did not harvest any grooved Tanner crab. The Bering Sea District grooved Tanner crab harvest in 2004 was confidential because only one processor participated in the fishery.

Stock Status

The grooved Tanner crab population in the Bering Sea District is not surveyed; subsequently, no estimates of population abundance are available for this stock. Fishery data is the primary source of information regarding abundance and stock status. Based on the available information, the Bering Sea grooved Tanner crab stock was heavily exploited in the mid-1990s and catch rates decreased to a level where the commercial fishery was no longer economically viable. Since then, the stock has been managed more conservatively and appears to have stabilized or recovered slightly.

BERING SEA TRIANGLE TANNER CRAB

Historic Background

Historically, triangle Tanner crabs *Chionoecetes angulatus* were taken as incidental harvest in the grooved Tanner crab fishery. Vessel operators have verbally reported retention of triangle Tanner crabs before 1994. To obtain biological information on grooved Tanner crabs, ADF&G implemented 100% onboard observer coverage on vessels fishing for deep-water Tanner crabs in 1994. That year, onboard observers documented a single incidence of triangle Tanner crab bycatch, but prior to 1995, this species had not been commercially harvested. In 1995, four vessels registered to retain triangle Tanner crabs, and harvested over 49,000 pounds for a total fishery value of $50,000. In 1996, 2000, and 2001, only one vessel delivered triangle Tanner crabs as incidental harvest each year. No vessels registered to fish triangle Tanner crabs in the Bering Sea District in 1997, 1998, 1999, or 2002 (Table 2-32).

Due to the lack of stock abundance data for this species fishing will be limited to incidental harvest during the grooved Tanner and Pribilof District golden king crab fisheries. Vessels registered to fish for grooved Tanner crabs will be permitted to retain incidentally taken triangle Tanner crabs at up to 50% of the weight of the target species. In the Pribilof District golden king crab fishery, incidentally taken triangle Tanner crabs may be retained at up to 5% of the weight of the target species onboard the vessel. This harvest level is consistent with the historic catches and allows for limited retention of this deepwater species that is believed to experience significant handling mortality when caught and released.

2004 Fishery

There was no directed fishing for triangle Tanner crabs in the Bering Sea District in 2004. Three vessels registered to retain triangle Tanner crab incidentally taken during the Pribilof District golden king and Bering Sea grooved Tanner crab fisheries.

Stock Status

Surveys of population abundance are not conducted for triangle Tanner crabs in the Bering Sea; thus the status of this stock is unknown. There are currently no plans to survey this population.

MISCELLANEOUS SHELLFISH SPECIES BERING SEA

DESCRIPTION OF AREA

The Bering Sea portion of Registration Area J, as described herein for miscellaneous shellfish, includes all Bering Sea waters of both the Territorial Sea (0-3 nautical miles from shore) and the Exclusive Economic Zone (3-200 miles from shore) north of the latitude of Cape Sarichef at 54° 36’ N lat. and east of the United States-Russia Maritime Boundary Line of 1991 (Figure 2-14).

INTRODUCTION

Miscellaneous shellfish species include hair crabs *Erimacrus isenbeckii*, green sea urchins *Strongylocentrotus droebachiensis*, red sea cucumbers *Parastichopus californicus*, snails *Neptunea* and *Buccinum*, octopus *Octopus dofleini*, and cherry crabs *Paralomis multispina*, a deepwater crab closely related to king crabs. These species have been harvested in relatively small amounts when compared to the commercial king and Tanner crab fisheries in the Bering Sea. To regulate fisheries for these species, ADF&G issues commissioners permits in accordance with 5 AAC 38.062. PERMITS FOR OCTOPI, SQUID, HAIR CRAB, SEA URCHINS, SEA CUCUMBERS, SEA SNAILS, CORAL, AND OTHER MARINE INVERTEBRATES.

Those species of current or historic interest in the Bering Sea include cherry, hair and Dungeness crabs *Cancer magister*, octopus, and snails. North Peninsula District shrimp do not fall under the miscellaneous species category, but are included in this report due to low or infrequent annual harvests. The fishery for shrimp in the Bering Sea District is described in the Aleutian Islands section of this report.

BERING SEA HAIR CRABS

Description of Area

The Bering Sea hair crab fishery is prosecuted in an area that includes all waters north of 54° 36' N lat., south of 60° N lat., east of the United States-Russia Maritime Boundary Line of 1991, and west of 168° W long. (Figure 2-15). There is no formal hair crab registration area established in regulation; rather, the fishing area is set using the terms of a commissioner’s permit.

Historic Background

The fishery for hair crabs in the Bering Sea was pioneered by the Japanese fleet during the 1960s and first commercially exploited by the U. S. fleet in 1979. In its early years, the domestic hair crab season was opened by emergency order concurrent with the Bering Sea Tanner crab fishery. In 1980, the BOF established a year-long season within a three-mile area of the Pribilof Islands. In 1984, under conditions of a commissioner’s permit issued by ADF&G, the year-round hair crab fishery was expanded in the Bering Sea District. Between 1979 and 1992, however, the majority of hair crabs landed was reported as incidental catch in the Bering Sea Tanner crab fisheries.

Beginning in the fall of 1993, under the terms of the Commissioner’s Permit, all vessels fishing for hair crabs were required to carry an observer during all fishing activities (ADF&G 1996). In 1994, hair crab pots were defined by BOF as pots with a rigid tunnel opening in the top of the pot, with a tunnel perimeter not to exceed 26 inches and a base that does not exceed 48 inches in any one direction. Legal retention of hair crabs is permitted only from hair crab pots.

In 1996, due to a steady increase in the number of vessels participating in this fishery, the Alaska Legislature authorized the Commercial Fisheries Entry Commission (CFEC) to regulate vessel licenses in the Bering Sea hair crab fishery. Vessel qualification was based on participation in at least one of the qualifying years from 1992 to 1995. Licenses were issued to 23 vessels for those waters beyond five nautical miles of Saint George and Saint Paul Islands. Also included in this legislation were provisions which allow any vessel 58 feet and under to fish within five nautical miles of Saint George and Saint Paul Islands. In addition, it was the intent of the Legislature, expressed in the moratorium, that BOF maintain 100% observer coverage on all vessels participating in the Bering Sea hair crab fishery. However, ADF&G exempted vessels under 44 feet in length from mandatory observer coverage because of observer safety considerations (ADF&G 1998).

Observers provide catch and effort reports that are expanded into harvest estimates. Their data, along with information collected from vessel operators and processors, allow ADF&G to manage the Bering Sea hair crab fishery inseason. Catch reports from processors are used to verify estimates generated from observer data. Reports from fishers provide information regarding distribution of crabs, gear conflicts, weather, and other fishing conditions.

Participation and harvest in the Bering Sea hair crab fishery has varied greatly over the history of the U. S. fishery. Effort and harvest reached a peak of 67 vessels and 2.4 million pounds in 1980 when the fishery was prosecuted as an incidental harvest fishery during the Tanner crab season (Table 2-33 and Figure 2-16). Between 1985 and 1990, effort was minimal due to low stock abundance. Since the 1996 moratorium, effort has remained at 19 or fewer vessels and in 2000 only three vessels made landings. In the 1990s, harvest reached a peak of 2.3 million pounds in the 1993/94 season. Total fishery value peaked in 1995 at $5.7 million (Table 2-34). Since 1995, both effort and GHL have been declining. During the 2000 season, only 1,500 pounds of hair crabs were harvested, for a total fishery value of $5,000.

Since the establishment of the year-round permit fishery in the Bering Sea in 1984, average weight and CPUE have also fluctuated significantly. The highest CPUE of 10 crabs per pot was recorded in 1991, while CPUE dropped to less than one crab per pot during the spring 1993 and 2000 seasons. Average weight of retained hair crabs was highest during the early years of the U.S. fishery at 2.1 pounds, but decreased to 0.9 pound in 1991. In the late 1990s, the average weight of retained hair crabs has remained around 1.6 pounds (Table 2-33).

Beginning in 1993, the hair crab fishing season opening date was set at November 1, which conflicted with the Bristol Bay red king crab fishery. In 1998, ADF&G solicited comments from industry regarding a new opening date. A consensus was reached that the fishery would open 10 days after the closure of the Pribilof District or Saint Matthew Island Section king crab fisheries, whichever closed later. The fishery opened on October 8 in 1998. In 1999, BOF changed the Bristol Bay red king crab season opening to October 15; thus the hair crab fishery opening was again in conflict the opening of the BBRKC season. Consensus was reached with industry to conduct the fishery 10 days after the closure of the Bristol Bay red king crab fishery. Subsequently, in 1999 and 2000, the hair crab season opened on October 30.

The GHL for Bering Sea hair crabs is established using results of the NMFS Bering Sea trawl survey. Since there are no registration areas, districts, or sections established in regulation for hair crabs, survey results are described in terms of Bering Sea king crab registration areas, districts and sections (Figure 2-5). Because confidence in the results of this survey is relatively low, a maximum 20% fishery exploitation rate has been used to determine the GHL. Male hair crabs ≥ 83 mm in CW are defined as legal crabs in the commissioner's permit for this fishery.

Typically, the majority of legal-sized male hair crabs encountered during the trawl survey have been found in the vicinity of the Pribilof Islands and the fishery harvest has occurred primarily in the area east of Saint Paul Island. During the 1999 survey, however, 65% of the large male hair crab population in the Bering Sea was found in the Northern District instead of the traditional Pribilof District. Subsequently, in 2000, the Pribilof District was closed to commercial hair crab fishing due to low stock abundance, and for the first time, a directed hair crab fishery was opened in the Northern District of king crab Registration Area Q. Given the experimental nature of the fishery, the low abundance of small male crabs found during the 2000 survey, the relative size of the stock, and lack of fishery data from the Northern District, the harvest rate was set conservatively at 10% of the estimated large male hair crab abundance. As a result of low stock abundance, the Bering Sea was closed to hair crab fishing in 2001 and 2002.

In 2003, CFEC instituted a vessel-based limited entry program for the Bering Sea hair crab fishery and issued hair crab permits to qualified vessel owners. Impact of the limited entry program on fishery management is currently unknown, but the program should lead to a more easily managed fishery if stock conditions allow a reopening. It is estimated that approximately 20 permanent licenses will be issued for the fishery.

2004 Fishery

The 2004 Bering Sea hair crab fishery was closed in both the Northern and Pribilof Districts due to low stock abundance.

Stock Status

The abundance index for large male hair crabs declined from 1981 to 1992, increased from 1992 to 1995, and decreased again from 1995 to 1999. The 2004 NMFS trawl survey of the eastern Bering Sea indicated that in the Northern and Pribilof Districts increased over 50% from the 2003 level, but still remain near historic low levels. Population trends observed during the last eight years and weak performance of the most recent commercial fisheries indicate that the Bering Sea hair crab population is severely depressed. Precise estimates of total female and small male hair crab abundance have never been available from current trawl survey data. In general, the biology and habitat usage of hair crabs makes them difficult to survey with trawl gear. Large male abundance is thought to be better estimated because general recruitment trends can be followed in the survey results and fishery harvests.

BERING SEA OCTOPUS

The last directed fishery for octopus in the Bering Sea occurred in 1995, with areas fished covering both Aleutian Islands and Bering Sea waters. Less than three vessels made landings; therefore, the harvest information is confidential. Since 1995, all reported harvests in the Bering Sea have been incidental to other fisheries. Vessel operators may retain incidentally caught octopus at up to 20% of the weight of the target species.

In 2004, Ninety one vessels made 190 landings with 61,230 pounds of octopus landed from the Bering Sea. Another 25,527 pounds were discarded at sea (Table 2-35). The majority of the octopi caught in the Bering Sea are retained for use as bait in other fisheries.

The incidental harvest of octopi in Bering Sea groundfish fisheries more than doubled from 2002 to 2003, but the 2004 harvest decreased 35% from the 2003 level. Verbal reports from fishers and processors indicate that market interest in octopuses has increased and that some fishers are operating to increase their incidental harvest of octopuses while remaining below the maximum retainable amount. The department intends to closely monitor effort in the octopus fishery as well as the spatial and temporal distribution of the incidental harvest.

CHERRY CRABS

Fishing for cherry crabs is managed under the terms of a commissioner’s permit. Although one vessel was registered to fish for cherry crabs in 1995, no commercial harvest was reported. One vessel, for which landings are confidential, participated in the 1996 fishery. No vessels requested commissioner’s permits to fish for cherry crabs in the Bering Sea District from 1997 through 2004. Given the lack of available data on this stock, and prior fishery information indicating small stock size, the department will not issue permits allowing harvest of cherry crabs.

SEA CUCUMBERS AND SEA URCHINS

The season for sea cucumbers and sea urchins in the Bering Sea Area opens October 1 under terms of a commissioner’s permit with a GHL of 5,000 pounds of eviscerated red sea cucumbers and 5,000 pounds round weight for green sea urchins. The small GHLs were established to permit conservative commercial exploration of areas that lacked historic harvest data and to allow ADF&G to collect information for future management purposes (Ruccio and Jackson 2000). No commercial harvest of either species occurred in the Bering Sea District in 2001. In 2002, a separate guideline harvest range of 30,000 to 60,000 pounds of green sea urchins was established for the waters around Saint George Island. This harvest level was based on abundance estimates obtained from dive survey data and marketing factors. One diver harvested green sea urchins in the Saint George Island area in 2002; therefore, all harvest information is confidential.

In 2004, the GHL for the Bering Sea Area was set at 5,000 pounds each, for red sea cucumbers and green sea urchins. No divers registered to harvest green sea urchins or red sea cucumbers in 2004.

SNAILS

Historic Background

Commercial fishing for snails in the Bering Sea was initiated by the Japanese fleet in 1971 and continued until 1987, however little information is available from this early fishery. The Fishery Conservation and Management Act of 1976 required that foreign nations provide the United States with records concerning fisheries occurring inside the U.S. Exclusive Economic Zone (EEZ) and the Japanese began to provide fishing records following the passage of the act (MacIntosh 1979). NMFS recorded 14 vessels participating in 1971, five vessels in 1972, no vessels in 1973, and six vessels in 1974. No fishing occurred in 1975 and 1976. In 1977, records indicate that participation in the fishery increased to three vessels (MacIntosh 1980). In the 1980s all fishing was conducted by catcher-processor vessels. The majority of the retained catch during this early fishery was composed of the Pribilof Neptune *Neptunea pribiloffensis*. Smaller components of the retained catch were composed of *Buccinum angulossum* and *B. scalariforme* (MacIntosh 1980). Exvessel value was $242 thousand in 1977, increasing to $1.3 million by 1979. Russian vessels began fishing for snails in the same area in 1989.

The Foreign Fisheries Observer Program assigned observers to Japanese catcher-processors in the years 1984-1987 and later to Russian vessels in 1989. The Russian venture only lasted one year with minimal return. Converted Tanner crab pots were used in the early foreign fishery. Pots were long-lined in depths from 100 to 150 fathoms. Data from the Foreign Fisheries Observer Program showed the Japanese vessels pulled an average of 2,779 pots per day with an average soak time of 50 hours while the Russian vessels averaged just 1,219 pot lifts per day with an average soak time of 80 hours.

The U.S. fishery began in 1992 when two vessels registered to fish for snails. One vessel harvested snails as incidental harvest in the Tanner crab fishery and the second participated in a directed fishery for snails after the June closure of the hair crab fishery. Fishing for snails was limited to waters of the Bering Sea District west of 168° W long. from 1994 to 1996. In 1997, snail fishing was limited to waters west of 164° W long.

Observer coverage was required as a condition of the commissioner's permit issued in 1993 under 5 AAC 39.210 (h) MANAGEMENT PLAN FOR HIGH IMPACT EMERGING FISHERIES. Minimal crab bycatch was observed in the area west of 168° W long. Bycatch of legal sized king crabs was less than one animal per pot. Female snow crabs had the highest incidence of bycatch at one animal per pot (Tracy 1995).

Observer coverage was not required again until 1997 when two vessel operators expressed interest in fishing east of 168° W longitude. Vessels were restricted to grounds west of 164° W long. and north of 54° 36' N latitude. These restrictions were conditions of the permit issued under 5 AAC 38.062 PERMITS FOR OCTOPI, SQUID, HAIR CRAB, SEA URCHINS, SEA CUCUMBERS, SEA SNAILS, CORAL, AND OTHER MARINE INVERTEBRATES. There was no bycatch of red or blue king crabs; however, bycatch of Tanner crabs was observed. An estimated 17,300 female and 2,100 sublegal male Tanner crabs, in addition to 57,600 sublegal snow crabs, were captured in the 192,000 pots pulled.

In the 1997 fishery, average CPUE was 16 snails per pot, equal to the CPUE from vessels fishing northwest of the Pribilof Islands in the 1996 fishery. The majority of the catch for the 1997 season was composed of the genera *Neptunea* and *Buccinum*. Catches increased from 313,000 pounds in 1993 to 3,570,000 pounds in 1996 and then declined to 932,000 pounds in 1997 (Table 2-36 and Figure 2-17). The value of the fishery increased from $125 thousand in 1993 to over $1.05 million in 1996 and then dropped to $308 thousand in 1997 (Table 2-37). From 1998 to 2003, no snails were harvested from the Bering Sea.

2004 Fishery

No vessels registered to harvest snails from the Bering Sea in 2004.

Stock Status

The NMFS eastern Bering Sea trawl survey provides distribution and relative abundance information on Bering Sea snail populations. However, differential catchability of various species of snails makes accurate population estimates difficult.

NORTH PENINSULA DISTRICT

DESCRIPTION OF AREA

The North Peninsula District for shrimp management includes all Bering Sea waters of both the Territorial Sea (0-3 nautical miles from shore) and the Exclusive Economic Zone (3-200 miles from shore) east of the longitude of Cape Sarichef at 164° 55’30” W long. (Figure 2-18).

The North Peninsula District for management of Dungeness crabs includes all waters of both the Territorial Sea (0-3 nautical miles from shore) and the Exclusive Economic Zone (3-200 miles from shore) north of the latitude of Cape Sarichef at 54° 36’ N lat. (Figure 2-19).

SHRIMP

No vessels have registered for the North Peninsula District pot or trawl shrimp fishery since 1994. Currently, shrimp fishing is not permitted in this district due to a lack of data concerning the shrimp stocks.

DUNGENESS CRABS

Fishing effort for the North Peninsula Dungeness crab fishery has been sporadic, with few vessels participating. Typically the fishery has occurred north of Unimak Island. In 1995, six vessels made 19 deliveries for a harvest of 134,407 pounds. Catch information from 1996 to 1998 is confidential, as less than three vessels participated in each of those years. The average annual harvest in the three-year period from 1996-1998 was approximately 48,000 pounds. No vessels registered to fish for Dungeness crabs in the North Peninsula District in 1999. One vessel, for which landings are confidential, participated in the 2000 fishery. No vessels registered to fish for Dungeness crabs in 2001. In 2002, three vessels registered to fish for Dungeness crabs however harvest information is confidential because less than three processors purchased the harvest (Table 2-38). In 2003 no vessels registered to fish for Dungeness crabs in the North Peninsula District. A single vessel registered to fish for North Peninsula District Dungeness crabs in 2004 and all harvest information is confidential.

Stock Status

There is no population data available to determine the status of the North Peninsula Dungeness crab stock. This fishery is managed using size, sex, and season restrictions. Currently in this District only male Dungeness crabs with a shoulder width of 165 mm or larger may be taken between 12:00 noon May 1 through 12:00 noon October 18.

BERING SEA/ALEUTIAN ISLANDS COMMUNITY DEVELOPMENT QUOTA CRAB FISHERIES

DESCRIPTION OF AREA

The Bering Sea, for Community Development Quota (CDQ) fisheries, encompasses all waters of the Territorial Sea (0-3 nautical miles) and Exclusive Economic Zone (3-200 nautical miles from shore) north of Cape Sarichef (54° 36' N lat.), south of Cape Prince of Wales (65° 49' N lat.), and east of the U.S.-Russia Maritime Boundary Line, including the waters of Bristol Bay. For those CDQ fisheries managed by the ADF&G Westward Region, Cape Romanzof (61° 49' N lat.) is the northern boundary (Figure 2-20).

CDQ PROGRAM BACKGROUND

The North Pacific Fishery Management Council (NPFMC) established the CDQ Program in 1992 for walleye pollock and was later expanded to sablefish and Pacific halibut. In 1995, the NPFMC included certain Bering Sea king and Tanner crab stocks in the CDQ Program. The BOF adopted regulations for the Bering Sea/Aleutian Islands king and Tanner crab CDQ fisheries in 1997, and fisheries started in 1998. The State of Alaska manages the CDQ Program and ADF&G manages the crab CDQ fisheries.

Sixty-five coastal Bering Sea communities are eligible for the CDQ Program. These communities are aligned into six CDQ organizations and are collectively referred to as CDQ groups. The groups are Aleutian Pribilof Island Community Development Association (APICDA), Bristol Bay Economic Development Corporation (BBEDC), Central Bering Sea Fishermen's Association (CBSFA), Coastal Villages Regional Fund (CVRF), Norton Sound Economic Development Corporation (NSEDC), and Yukon Delta Fisheries Development Association (YDFDA).

The CDQ groups are non-profit entities, which may have for-profit subsidiaries. Each group submits comprehensive plans on the intended use of the CDQ funds, which vary widely between groups. Most include fishing-related investments, scholarships, training, employment services, and other projects which are intended to benefit the communities and regions the CDQ groups represent. Some groups are buying equity in fishing vessels which will harvest crab in both CDQ and general fisheries.

The CDQ groups receive allocations for the following Bering Sea crab fisheries: Norton Sound red king crab *Paralithodes camtschaticus*, Bristol Bay red king crab, Pribilof red and blue king crab *Paralithodes platypus*, St. Matthew blue king crab, Bering Sea snow crab *Chionoecetes opilio*, and Bering Sea Tanner crab *Chionoecetes bairdi*. To be eligible as a CDQ crab fishery, the crab stock must have an established guideline harvest level (GHL), be managed under the Fishery Management Plan (FMP) for Bering Sea/Aleutian Islands king and Tanner crabs and have a reliable survey to estimate abundance. The CDQ allocation percentage is based on the total actual harvest each year. The annual CDQ allocations for crab were phased in over a three-year period (3.5% of the total allowable fishery harvest for 1998, 5.0% for 1999, and reaching a maximum of 7.5% for 2000 and subsequent years). The individual CDQ group allocation varies in each fishery (Table 2-39). The value of the crab fisheries to the CDQ groups is estimated to be 20-30% of the exvessel fishery value.

The CDQ groups are required to submit fishery plans to the department prior to each CDQ crab fishery. Plans include names of participating vessels and operators, vessel information regarding safety and communications, intended processor and location, method of attaining but not exceeding the allocation, and if a cooperative effort, the method for apportioning the allocation.

All CDQ crab fishing seasons have been subsequent to the general fisheries season, and all CDQ vessels have also participated in the prior general fishery. Before vessels are allowed to register for the CDQ fishery, ADF&G must generate an accurate estimate of the general fishery harvest. Fishers are required to obtain buoy tags for all gear fished, and if required an onboard observer. At the time of registration all gear on board the vessel must be tagged with CDQ buoy tags and all gear in the water must be tagged before being deployed in the fishery. Additionally, all gear must be in compliance with the closure requirements of the general fishery.

This report addresses all CDQ crab fisheries except the Norton Sound CDQ red king crab fishery.

FISHERY HISTORY

The CDQ allocation for 1998 was 3.5% of the total harvest of red king crab, blue king crab and snow crab. This was increased in 1999 to 5.0% of the total harvest, and again in 2000 to 7.5% of the total harvest of king and Tanner crab.

All six CDQ groups participated in the CDQ fisheries; however, not all groups participated in each fishery. All CDQ groups have participated in the snow crab fishery yearly. Five groups participated in the St. Matthew Island Section CDQ blue king crab fishery in 1998 and one group participated in the Pribilof red and blue king crab CDQ fishery, the only year a commercial fishery has occurred since the inception of the CDQ program for crab. Five groups participated in the Bristol Bay red king crab CDQ fishery from 1998 to 2000, and all six groups have participated since. No Tanner crab fishery has occurred due to low stock abundance.

Regulations pertaining to the CDQ fisheries authorize a harvest prior to the general fishery; however, the department did not allow a CDQ harvest before the general fishery during the first year. A full understanding of the impact of these new fisheries and adequate staff to handle the increased management burden was needed before allowing CDQ fisheries to occur prior to the general fisheries. The department's intent was to allow CDQ groups to harvest part of their allocation before the general fishery during the second and subsequent years of the program. This would have allowed CDQ groups to harvest part of their 1999 allocation of snow crab in the fall of 1998. The National Marine Fisheries Service (NMFS) determined that the CDQ regulatory language did not allow for a harvest of the allocation outside of the calendar year to which it was assigned. The intent of NMFS was not to impede ADF&G management of the CDQ crab fisheries. The federal CDQ regulations were revised, but not in time for any harvest of the 1999 allocation of snow crab to occur in the fall of 1998. The Alaska Board of Fisheries (BOF) agreed to address an agenda change request at the March 1999 meeting to consider a proposal to prohibit any CDQ harvest prior to the general fishery. Representatives of processors and non-CDQ fishers contended that CDQ crabs on the market prior to the general fishery would be detrimental to the value of the general fishery. The BOF directed the CDQ, non-CDQ and processor representatives to reach a compromise, and adopted the compromise into regulation. The new regulations allow a CDQ king or Tanner crab fishery prior to the general fishery only when the GHL is 50 million pounds or more, and a maximum of 30% of the CDQ allocation may be harvested preseason.

In 1999, the department changed permitting procedures after the allocation was exceeded in the snow crab fishery for two consecutive years. Permits for CDQ fisheries were previously issued only to vessels fishing for the groups. These permits were issued before the actual allocation was established, and therefore did not reference the CDQ group's harvest allocation. Permits were henceforth to be issued to each CDQ group, initially stating the group allocation percentage and followed by an addendum with the actual allocation in pounds. The vessels were to be issued a permit that referred to the group permit and the associated allocation.

Observer coverage requirements have fluctuated over the history of the CDQ crab fisheries. During the first year of CDQ crab fishing operations, onboard observers were required during all fishing operations. In 1999, observer coverage was reduced in the CDQ snow crab fishery from one observer per vessel to one per CDQ group while during the Bristol Bay CDQ red king crab fishery, coverage remained at one observer per vessel. Observer coverage in the 2000 CDQ snow crab fishery was increased from one observer per group to two per group. During the 2001 CDQ Bristol Bay red king crab fishery, only one observer was required per group. In previous years, all CDQ vessels for this fishery were required to carry on board observers. Observers collect biological data and document the fishing practices of the CDQ fleet.

2004 CDQ Fisheries

Bering Sea CDQ Snow Crab Fishery

The 2004 Bering Sea CDQ snow crab fishery occurred subsequent to the general snow crab fishery. The 2004 CDQ allocation was 7.5 percent of the total snow crab commercial harvest. Based on inseason processor reports and hailed weights for the general fishery, the CDQ allocation was 1,782,081 pounds. All six CDQ groups participated in the fishery. The percent allocated to each group ranged from 8-20%. Percentages allocated to each group are determined by a percentage set forth for these CDQ groups by the Alaska Department of Community and Economic Development (ADCED).

Ten vessels participated in the fishery. Data from fish tickets show that those vessels made 25 deliveries for a harvest of 1,772,222 pounds including deadloss, approximately 99.4% of the allocation (Table 2-40). Two of the CDQ groups exceeded their individual group allocations.

Permits were issued to each CDQ group prior to the closure of the general fishery on January 23. The permit stated the group's allocation, listed the vessel(s) requested by the group and authorized by ADF&G to participate in the fishery, and stated that those vessels must comply with requirements such as dates of operation, pot limits, buoy tags, and observer coverage. Vessel registration could begin 8:00 AM January 29, 72 hours after the closure of the general fishery. CDQ groups were notified of their preliminary allocation January 27. Final allocations were announced February 6 after processing of all general fishery harvest was completed. During the fishery, four of the groups received amended allocations resulting from poundage transfers. Transfers were made after two of the groups completed fishing and found their final landings were less than expected. Transfers were approved through the ADCED and ADF&G.

The first vessel began fishing on January 29 and fishing operations concluded on March 20. The first delivery of CDQ snow crab occurred on February 7 with the final delivery March 20. Average exvessel price per pound in the 2004 CDQ snow crab fishery was $1.99 (Table 2-41), slightly less than the general fishery where the average price per pound was $2.05. The fishery value to the fleet was approximately $3.48 million, and the estimated value to the CDQ groups was 20-30% of the CDQ fleet fishery value.

The average number of legal male crab per pot pull (catch per unit effort or CPUE) was 98 retained crabs per pot, a substantial decrease from the 2003 CDQ CPUE of 120 retained crabs per pot, and less than the general fishery CPUE of 157 retained crabs per pot. Average weight of crabs in the CDQ fishery was 1.3 pounds, the same as the general fishery. Catches were landed at three shorebased processors located in Akutan, Dutch Harbor, and St. Paul. No floater-processors operated during the CDQ fishery. One catcher processor vessel participated in the CDQ fishery.

Observer coverage in the 2004 fishery was two for each group, the same coverage employed since 2000. Since each group utilized two or fewer vessels, all vessels in the fleet fished with an onboard observer for the entire season. Observers collected biological data, provided inseason harvest rates to the department, and documented fishing practices of the CDQ fleet.

Saint Matthew Island Section CDQ Blue King Crab Fishery

No CDQ harvest of Saint Matthew Island Section blue king crab occurred in 2004 due to closure of the commercial fishery.

Pribilof District CDQ Red And Blue King Crab Fishery

No CDQ harvest of Pribilof District red or blue king crab occurred in 2004 due to closure of the commercial fishery.

Bristol Bay CDQ Red King Crab Fishery

The 2004 Bristol Bay CDQ red king crab fishery allocation based on inseason processor reports and hailed weights from the general fishery, was 1,135,326 pounds. All six CDQ groups participated in this fishery.

Permits were issued to each CDQ group prior to the closure of the general fishery on October 18. The permit stated the group's preliminary allocation, which is determined by a percentage set forth for each CDQ group by the ADCED. The permit listed the vessel(s) requested by the group and authorized by ADF&G to participate in the fishery, and stated that those vessels must comply with requirements such as dates of operation, pot limits, buoy tags, and observer coverage. Vessel registration could begin at 8:00 am October 22, slightly over 72 hours after closure of the general fishery. Two vessels registered on October 22, one registered October 23, two registered October 24, three registered October 25, two registered October 26, one registered October 27, and the last vessel registered October 28. The final fishery allocations were announced October 27. Deliveries began November 3, and the final delivery was made November 15. Twelve vessels made 21 landings for an overall harvest of 1,133,013 pounds and a fishery value of approximately 4.5 million dollars. All CDQ groups were under their allocation.

The average CPUE was 31, higher than the CPUE of 23 for the general fishery, but the same as the 2003 CDQ fishery. The average soak time during the CDQ fishery was 67 hours compared to a soak time of 28 hours during the general fishery. Average weight of crabs in the CDQ fishery was 6.8 pounds, the same average weight for the general fishery. Two of the groups used three vessels to harvest their allocation, two groups used two vessels, and the remaining two groups used one vessel each.

Prior to 2001, all CDQ vessels for this fishery were required to carry onboard observers. During the 2001 to 2004 seasons, only one observer was required per CDQ group. Based on this level of coverage, 66% of the CDQ fleet had observer coverage. During the fishery observers collected biological data, provided inseason harvest rates to the department, and documented fishing practices of the CDQ fleet.

Bering Sea CDQ Tanner Crab Fishery

No CDQ harvest of Tanner crab occurred during 2004 due to closure of the commercial fishery.

BERING SEA KING AND TANNER CRAB BUOY IDENTIFICATION PROGRAM

INTRODUCTION AND BACKGROUND

Early 1990s Bering Sea and Aleutian Islands (BSAI) crab fisheries were characterized by increased fishing effort, decreased guideline harvest levels (GHL), and shorter fishing seasons than prior years. In response to these changes, the BSAI crab industry submitted a petition to the BOF requesting the implementation of pot limits. The petition was supported by data from ADF&G indicating that conservation and management efforts were hampered during low GHL fisheries due in part to the amount of gear fishing being utilized. On March 20, 1991 the BOF proposed an agenda change request regarding this issue and subsequently adopted BSAI pot limit regulations. Effective August 1, 1992 these regulations limited the number of pots a vessel may operate while harvesting BSAI king *Paralithodes* and *Lithodes*, and Tanner *Chionoecetes* crabs. The buoy identification program was created to implement these regulations and as per Alaska statute designed to be completely self-supportive by generating funds through the sale of buoy tags.

Buoy identification stickers were first implemented during 1992 Bristol Bay red king crab *P. camtschaticus* season, but were temporarily suspended due to product failure. Pot limit requirements for Bering Sea Tanner crab fisheries remained in effect until repealed by National Marine Fisheries Services on November 30, 1992. According to the Fishery Management Plan for Bering Sea /Aleutian Island King and Tanner Crab, pot limit regulation is a category II measure (NPFMC 1998). Category II measures may be adopted at the state level but are subject to the federal appeal process and must adhere to national standards requiring regulation application to be nondiscriminatory. Consequently, in February 1993 BOF passed differential pot limit regulations. Each fishery has specific pot limits based on vessel overall length (OL) (Table 2-42). Vessels in excess of 125 feet OL are entitled to operate the maximum number of pots allowed for a fishery, and vessels 125 feet or less in OL may fish 80% of the maximum pot limit. Further differential pot limit regulations for the Bristol Bay red king crab fishery were adopted on an interim basis August 27, 1997. The regulations created an 11-tier pot limit system dependent on fishery GHL and anticipated fleet size. The tiered system was made permanent March 1999.

IMPLEMENTATION

Beginning with 1992-1993 Bristol Bay king and Bering Sea Tanner crab seasons, ADF&G employed a Fish and Wildlife Technician III to administer the buoy identification program. Regulations providing implementation of the buoy identification program are stated in Alaska Statute 16.05.050. POWERS AND DUTIES OF THE COMMISSIONER and Alaska Statute 16.05.632. IDENTIFICATION OF SHELLFISH POTS OR BUOYS, OR BOTH, USED IN THE TAKING OF KING CRAB AND REQUIREMENTS FOR BUOYS.

By May 1993 heavy-duty, self-locking, nylon, zip tie tags had taken the place of buoy stickers. After use in several fisheries, numerous quality control problems and industry complaints prompted ADF&G to initiate trial tests of other manufactured tags. Eventually, a new style buoy tag was procured which required an independent means of attachment. The Alaska Department of Fish and Game initially supplied zip ties for tag attachment at no additional charge, but dispersal was discontinued due to high failure rates. Consequently, industry is now responsible for tag attachment. The new style tags were first issued in September 1998 and continue to be used.

REPLACEMENT TAGS

Buoy tag replacement issues were resolved during the initial BOF meeting regarding pot limits. Regulations were adopted based on concerns from the Division of Fish and Wildlife Protection regarding prosecution of cases involving replacement tags. Specifics regarding replacement tag sales are included in 5 AAC 34.826. (b) KING CRAB POT MARKING REQUIREMENTS FOR REGISTRATION AREA T, 5 AAC 34.926. (b) KING CRAB POT MARKING REQUIREMENTS FOR REGISTRATION AREA Q, and 5 AAC 35.526. (b) TANNER CRAB POT MARKING REQUIREMENTS FOR REGISTRATION AREA J.

Between the 1994 Bristol Bay red king crab and Bering Sea Tanner crab fisheries, and prior to 1995 snow crab season, the Dutch Harbor ADF&G office received input from fishers concerned with tag replacement regulations. At the time, vessels delivering to remote areas such as King Cove or Saint Paul were unable to obtain replacement tags without travel to Dutch Harbor. Some vessel operators felt the cost of travelling to Dutch Harbor with three crewmembers was prohibitive to obtaining replacement tags and would promote illegal fishing.

During 1998-1999 seasons, stakeholders reiterated buoy tag replacement issues. In response to these concerns ADF&G began allowing permit holders to file an official affidavit in Saint Paul or King Cove, however ADF&G personnel must be available for verification. This change was implemented prior to 2000 Bering Sea snow crab fishery.

BUOY IDENTIFICATION TAG REFUNDS

Since the inception of the tag program, refunds for buoy tags have not been offered because the $2.00 fee per tag covers administrative and program implementation costs. However, during the 2001 Bering Sea snow crab fishery, two buoy tag refunds were issued as per 15 AAC 116.120. REFUND OF LICENSE FEES.

Requests for buoy identification tag refunds may be procured only through ADF&G Headquarters in Juneau. To request a refund, the following information must be sent by the tag administrator to regional administrative staff: name, address, and social security number of the permit holder, vessel name and

ADF&G number, a copy of the check used for original payment, number of tags purchased/returned, the imprinted sequential tag numbers, return date of unused, complete set of tags and person who received the tags, budget code for refunding, and a statement from the permit holder explaining the refund request. All tag refund requests will be evaluated by ADF&G Headquarters in Juneau.

VESSEL LENGTH VERIFICATION

The tiered pot limit regulations are based in part on vessel overall length (OL). These measurements are outlined in 5 AAC 34.825 (j) LAWFUL GEAR FOR REGISTRATION AREA T and 5 AAC 35.525 (f) LAWFUL GEAR FOR REGISTRATION AREA J. In order to obtain the maximum number of buoy tags allotted per fishery all vessels with OL in excess of 125 feet must present valid, original or notarized, U.S. Coast Guard or certified marine surveyor documentation, showing the vessel's OL. The permit holder is required to show OL documentation the first time buoy tags are purchased, and when any change in vessel OL occurs. The ADF&G office in Dutch Harbor has an established list of 98 vessels with documented OL in excess of 125 feet.

ADMINISTRATION OF THE BUOY IDENTIFICATION PROGRAM

Bering Sea buoy tags are issued from the ADF&G offices in Kodiak and Dutch Harbor for an administrative fee of $2.00 per tag. Tags are issued to the holder of a valid, fishery specific, Commercial Fisheries Entry Commission interim use permit card. An authorized agent may be issued tags if an affidavit is signed by the permit holder and filed with ADF&G in Dutch Harbor. Also upon request, ADF&G Dutch Harbor office will send buoy tags through the U.S. Mail, via priority mail with insurance and return receipt. Due to potential weather delayed mail service, the deadline for mail request is generally two to three weeks prior to the opening of each fishery. The deadline is announced in fishery specific news releases regarding pot limits.

2004 BUOY TAG SALES

Several of the Bering Sea crab fisheries were not open to commercial harvest because stocks did not meet minimum threshold levels. The Pribilof Island red king and blue king crab, Saint Matthew Island blue king crab, and Bering Sea Tanner crab fisheries were closed in 2004. Tags for these fisheries are stored in Dutch Harbor ready for issue when needed (Table 2-43).

There were no tags procured for the 2004 Bering Sea snow crab fishery. Tag sales for this fishery are as follows: from Dutch Harbor 142 vessels purchased 11,020 tags (27 were mail requests) and in Kodiak 49 vessels purchased 3,650 tags. One hundred ninety one vessels purchased 14,670 tags and 4 replacement tags were issued for 14,674 total tags. Ten vessels purchased 1,428 tags for the 2004 Bering Sea snow crab CDQ fishery. No replacement tags were issued.

Sixteen vessels purchased tags for the 2004 Eastern Aleutian District Tanner fishery, 192 tags were sold and five replacements issued, a total of 197 tags.

Five vessels purchased tags for the 2004 Pribilof District golden king crab fishery, 210 tags were sold and 6 replacements issued, for a total of 216 tags. There was no fishing effort in the 2004 Northern District, Saint Matthew Island Section golden king crab and South Peninsula grooved Tanner crab.

There were 65,000 tags procured for the 2004 Bristol Bay red king crab fishery. Tag sales for this fishery are as follows: from Dutch Harbor 195 vessels purchased 39,807 tags (38 were mail requests), in Kodiak 56 vessels purchased 9,699 tags. Two hundred fifty one vessels purchased 49,506 tags and 17 replacement tags were issued for 49,523 total tags. Twelve vessels purchased 2,258 tags for the 2004 Bristol Bay red king crab Community Development Quota (CDQ) fishery. No replacement tags were issued. The 2004 Petrel Bank red king crab fishery was not open to commercial harvest because stocks did not meet minimum threshold levels.

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Table 2-1.-Bristol Bay commercial red king crab fishery harvest data, 1966-2004.

Year	Number of				Number of Pots			
	Vessels	Landings	Crabs[a]	Harvest[a,b]	Registered	Pulled	CPUE[c]	Deadloss[b]
1966	9	15	140,554	997,321	NA	2,720	52	NA
1967	20	61	397,307	3,102,443	NA	10,621	37	NA
1968	59	261	1,278,592	8,686,546	NA	47,496	27	NA
1969	65	377	1,749,022	10,403,283	NA	98,426	18	NA
1970	51	309	1,682,591	8,559,178	NA	96,658	17	NA
1971	52	394	2,404,681	12,955,776	NA	118,522	20	NA
1972	64	611	3,994,356	21,744,924	NA	205,045	19	NA
1973	67	441	4,825,963	26,913,636	NA	194,095	25	NA
1974	104	605	7,710,317	42,266,274	NA	212,915	36	NA
1975	102	592	8,745,294	51,326,259	NA	205,096	43	1,639,483
1976	141	984	10,603,367	63,919,728	NA	321,010	33	875,327
1977	130	1,020	11,733,101	69,967,868	NA	451,273	26	730,279
1978	162	926	14,745,709	87,618,320	NA	406,165	36	1,273,037
1979	236	889	16,808,605	107,828,057	NA	315,226	53	3,555,891
1980	236	1,251	20,845,350	129,948,463	78,352	567,292	37	1,858,668
1981	177	1,026	5,307,947	33,591,368	75,756	542,250	10	711,289
1982	90	255	541,006	3,001,210	36,166	141,656	4	95,834
1983				FISHERY CLOSED				
1984	89	137	794,040	4,182,406	21,762	112,556	7	35,601
1985	128	130	796,181	4,174,953	30,117	85,003	9	6,436
1986	159	230	2,099,576	11,393,934	32,468	178,370	12	284,127
1987	236	311	2,122,402	12,289,067	63,000	220,871	10	120,388
1988	200	201	1,236,131	7,387,795	50,099	153,004	8	23,537
1989	211	287	1,684,706	10,264,791	55,000	208,684	8	81,334

-continued-

Table 2-1.-(page 2 of 2)

Year	Number of Vessels	Number of Landings	Number of Crabs[a]	Harvest[a,b]	Number of Pots Registered	Number of Pots Pulled	CPUE[c]	Deadloss[b]
1990	240	331	3,120,326	20,362,342	69,906	262,131	12	116,527
1991	302	324	2,630,446	17,177,894	89,068	227,555	12	119,670
1992	281	289	1,196,958	8,043,018	68,189	205,940	6	9,000
1993	292	361	2,261,287	14,628,639	58,881	253,794	9	133,442
1994				FISHERY CLOSED				
1995				FISHERY CLOSED				
1996	196	198	1,249,005	8,405,614	39,461	76,433	16	24,166
1997	256	265	1,315,969	8,756,490	27,499	90,510	15	13,771
1998	274	284	2,140,607	14,233,063	56,420	141,707	15	53,716
1999	257	268	1,812,403	11,090,930	42,403	146,997	12	44,132
2000	246	256	1,166,796	7,546,145	26,352	98,694	12	76,283
2001	230	238	1,196,040	7,786,420	24,571	63,242	19	57,294
2002	242	254	1,377,922	8,856,828	25,833	68,328	20	32,177
2003	252	275	2,335,614	14,530,248	46,964	129,019	18	228,272
2004	251	270	2,075,622	14,112,438	49,506	90,972	23	160,563

[a] General fishery only. Deadloss included.

[b] In pounds.

[c] Number of legal crabs per pot lift.

NA = Not available.

Table 2-2.-Bristol Bay commercial red king crab fishery economic data, 1980-2004.

		Value		Season Length	
Year	GHL[a]	Ex-vessel[b]	Total[c]	Days	Dates
1980	70-120	$0.90	$115.3	40	09/10-10/20
1981	70-100	$1.50	$49.3	91	09/10-12/15
1982	10-20[d]	$3.05	$8.9	30	09/10-10/10
1983		FISHERY CLOSED			
1984	2.5- 6.0	$2.60	$10.8	15	10/01-10/16
1985	3.0-5.0	$2.90	$12.1	8	09/25-10/02
1986	6.0-13.0	$4.05	$45.0	13	09/25-10/07
1987	8.5-17.7	$4.00	$48.7	12	09/25-10/06
1988	7.5	$5.10	$37.6	8	09/25-10/02
1989	16.5	$5.00	$50.9	12	09/25-10/06
1990	17.1	$5.00	$101.2	12	11/01-11/13
1991	18.0	$3.00	$51.2	7	11/01-11-08
1992	10.3	$5.00	$40.2	7	11/01-11/08
1993	16.8	$3.80	$55.1	9	11/01-11/10
1994		FISHERY CLOSED			
1995		FISHERY CLOSED			
1996	5.0	$4.01	$33.6	4	11/01-11/05
1997	7.0	$3.26	$28.5	4	11/01-11/05
1998	15.8	$2.64	$37.4	5	11/01-11/06
1999	10.1	$6.26	$69.1	5	10/15-10/20
2000	7.7	$4.81	$36.0	4	10/16-10/20[e]
2001	6.6	$4.81	$37.5	3	10/15-10/18
2002	8.6	$6.14	$54.2	3	10/15-10/18
2003	14.5	$5.08	$72.7	5	10/15-10/20
2004	14.3	$4.71	$65.7	3	10/15-10/18

[a] Guideline harvest level for general fishery only, millions of pounds.

[b] Average price per pound.

[c] Millions of dollars.

[d] Inseason revision to 4.7 million pounds.

[e] Delayed start due to weather.

Table 2-3.-2004 Bristol Bay commercial red king crab fishery inseason catch and effort projections for the non-AFA fleet based on 12-hour reports to ADF&G.

Date	Report Hour	Potlifts	Catch[a, b]	Cummulative Catch[a, b]	Cumulative Number of Crabs	CPUE[c]	Number of Vessels Reporting
16-Oct	12	842	52,728	52,728	7,989	9	62
16-Oct	24	11,827	1,977,508	2,030,236	307,612	24	57
17-Oct	36	13,953	2,320,661	4,350,897	659,227	25	65
17-Oct	48	15,367	2,326,333	6,677,230	1,011,702	23	58
18-Oct	60	16,297	2,520,655	9,197,885	1,393,619	24	32
18-Oct	72	23,098	3,224,168	12,422,053	1,882,129	21	20
19-Oct	84	10,667	1,015,399	13,437,452	2,035,978	14	25
Total		92,051	13,437,452	13,437,452	2,035,978	22	

[a] In pounds.

[b] Based on 6.6 pound average weight.

[c] Number of legal crabs per pot lift.

Table 2-4.-2004 Bristol Bay commercial red king crab fishery catch and effort projections for the AFA fleet, based on inseason vessel reports to the AFA fleet manager.

Date	Report Hour	Potlifts	Catch [a,b]	Cummulative Catch [a, b]	Number of Crabs	CPUE [c]	Percentage of Cap Harvested
16-Oct	12	0	0	0	0	0	0
16-Oct	24	1,053	215,193	215,193	31,646	30	14
17-Oct	36	1,639	351,023	566,216	51,621	31	36
17-Oct	48	2,101	463,216	1,029,432	68,120	32	66
18-Oct	60	1,399	231,547	1,260,979	34,051	24	81
18-Oct	72	1,224	141,216	1,402,194	20,767	17	90
19-Oct	84	322	33,803	1,435,997	4,971	15	92
Total		7,738	1,435,998	1,435,998	211,176	27	92

[a] In pounds.

[b] Based on 6.8 pound average weight.

[c] Number of legal crabs per pot lift.

Table 2-5.-Bristol Bay commercial red king crab general fishery catch by statistical area, 2004.

Statistical	Number of				Average		
Area	Landings	Crabs[a]	Pots Lifted	Harvest[a,b]	Weight[b]	CPUE[c]	Deadloss[b]
615630	11	63,907	2,124	423,183	6.6	30	11,596
625600	47	279,311	10,127	1,827,500	6.5	28	26,307
625630	36	233,371	7,890	1,522,440	6.5	30	27,880
635530	3	12,576	724	86,070	6.8	17	195
635600	93	328,991	19,333	2,253,159	6.8	17	15,954
635630	99	581,631	24,196	4,025,085	6.9	24	44,609
635700	4	29,732	864	191,641	6.4	34	1,300
645600	58	269,350	14,367	1,865,784	6.9	19	11,553
645630	65	255,165	10,594	1,772,459	6.9	24	15,782
645700	5	10,040	469	69,766	6.9	21	4,156
Other[d]	4	11,548	284	75351	6.7	41	1,231
Total	425[e]	2,075,622	90,972	14,112,438	6.8	23	160,563

[a] Deadloss included.
[b] In pounds.
[c] Number of legal crabs per pot lift.
[d] Combination of two statistical areas from which less than three vessels made landings.
[e] Number of statistical area landings is greater than the total number of vessel landings because a single vessel may fish in several statistical areas.

Table 2-6.-Bristol Bay red king crab cost-recovery harvest data, 1990-2004.

	Number of				Average		
Year[a]	Landings	Crabs[b]	Pots Lifted	Harvest[b,c]	Weight[c]	CPUE[d]	Deadloss[c]
1990	3	9,567	870	80,701	5.9	16	24,540
1991	2	30,351	518	205,851	6.4	62	12,817
1992	1	11,213	670	74,089	6.3	17	3,000
1993	1	8,384	464	53,200	6.3	18	800
1994	1	14,806	732	93,336	6.0	21	4,500
1995	2	14,123	564	80,158	5.5	26	2,339
1996	3	15,390	355	107,955	6.9	44	1,918
1997	4	21,698	658	154,739	6.3	37	18,040
1998	2	22,230	738	188,176	7.0	36	32,564
1999[e]	4	29,368	1,239	185,944	6.3	24	410
2000[f]	2	14,196	702	86,218	6.1	20	347
2001[e]	3	17,605	597	120,435	6.8	29	138
2002[e]	2	14,528	277	96,221	6.6	52	181
2003[f,g]	1	5,327	584	33,817	6.4	9	143
2004[e]	3	29,733	1,286	201,579	6.8	23	638

[a] All cost recovery from 1990-1998 was conducted to fund the Bering Sea and Aleutian Islands shellfish research program.

[b] Deadloss included.

[c] In pounds.

[d] Number of legal crabs per pot lift.

[e] Bering Sea and Aleutian Islands shellfish research and observer program cost recovery.

[f] Bering Sea and Aleutian Islands shellfish research program cost recovery.

[g] Includes 1,222 pounds harvested in the Pribilof District.

Table 2-7.-Bristol Bay red king crab cost-recovery economic performance data, 1990-2004.

Year[a]	Harvest[b]	Value Ex-vessel[c]	Value Total	Charter dates	Charter length[d]
1990	56,161	$5.10	$286,421	8/7-9/7	30
1991	193,034	$3.75	$723,878	9/2-10/7	35
1992	71,089	$5.24	$372,506	10/8-10/23	15
1993	52,400	$6.57	$344,268	8/20-9/20	31
1994	88,836	$5.21	$462,836	9/25-10/25	30
1995	77,819	$6.65	$517,496	8/1-8/31	31
1996	106,037	$4.53	$480,348	8/1-8/31	31
1997	136,699	$3.55	$485,281	7/25-8/21	28
1998	155,612	$3.25	$505,739	8/1-8/28	28
1999[e]	185,944	$6.18	$1,148,695	9/25-10/11,10/25-11/10	34
2000[f]	85,871	$5.82	$499,769	9/20-10/04	15
2001[e]	120,297	$5.18	$623,138	9/22-10/10, 10/23-11/8	36
2002[e]	96,087	$6.45	$619,761	9/23-10/9, 10/17-10/27	27
2003[f,g]	33,674	$5.56	$187,227	9/1-10/4	34
2004[e]	200,941	$4.98	$1,000,686	10/21-10/25,10/23-10/31,10/27-11/01	20

[a] All cost recovery from 1990-1998 was conducted to fund the Bering Sea and Aleutian Islands shellfish research program.

[b] In pounds. Deadloss not included.

[c] Average price per pound.

[d] In days.

[e] Bering Sea and Aleutian Islands shellfish research and observer program cost recovery.

[f] Bering Sea and Aleutian Islands shellfish research program cost recovery.

[g] Includes 1,204 pounds harvested in the Pribilof District.

Table 2-8.-Bristol Bay commercial red king crab fishery harvest composition by fishing season, 1973-2004.

	Percent		Size	Average		% Old
Season	Recruit	Postrecruit[a]	Limit[b]	Weight[c]	Length[d]	Shell
1973	63	37	6¼	5.6	NA	NA
1974	60	40	6¼	5.5	NA	NA
1975	21	79	6¼[e]	5.7	NA	NA
1976	56	44	6½	6.0	148	27.4
1977	67	33	6½	5.9	148	13.0
1978	75	25	6½	5.9	147	6.9
1979	47	53	6½	6.4	152	10.4
1980	44	56	6½	6.2	151	11.0
1981	14	86	6½[f]	6.3	151	47.4
1982	68	32	6½	5.5	145	24.6
1983			FISHERY CLOSED			
1984	59	41	6½	5.2	142	26.5
1985	66	34	6½	5.2	142	25.8
1986	65	35	6½	5.4	142	25.5
1987	77	23	6½	5.8	145	19.0
1988	59	41	6½	6.0	147	15.1
1989	58	42	6½	6.1	148	17.7
1990	49	51	6½	6.5	152	14.7
1991	44	56	6½	6.5	152	12.1
1992	33	67	6½	6.7	153	22.3
1993	33	67	6½	6.5	152	15.2
1994			FISHERY CLOSED			
1995			FISHERY CLOSED			
1996	31	69	6½	6.7	153	24.3
1997	28	72	6½	6.7	152	11.0
1998	40	60	6½	6.7	152	19.1
1999	72	28	6½	6.1	148	6.3
2000	65	35	6½	6.5	151	16.3
2001	54	46	6½	6.5	151	22.3
2002	61	39	6½	6.4	151	22.2
2003	72	28	6½	6.2	149	21.9
2004	52	48	6½	6.8	154	21.2

[a] Legal sized new and old shell greater than 153 mm carapace length defined as postrecruits.
[b] Minimum carapace width in inches.
[c] In pounds.
[d] Carapace length in millimeters.
[e] 6½ inches after 11/01.
[f] 7 inches after 10/20.
NA = Not Available.

Table 2-9.-Pribilof District commercial red and blue king crab fishery data, 1973/74-2004.

	Number of				Number of Pots		Average			
Year[a]	Vessels	Landings	Crabs[b]	Harvest[b,c]	Registered	Pulled	Weight[c]	CPUE[d]	Length[e]	Deadloss[c]
1973/74	8	13	174,420	1,276,533	NA	6,814	7.3	26	NA	NA
1974/75	70	101	908,072	7,107,294	NA	45,518	7.8	20	157.8	NA
1975/76	20	54	314,931	2,433,714	NA	16,297	7.7	19	159.1	NA
1976/77	47	113	855,505	6,611,084	NA	71,738	7.7	12	158.1	NA
1977/78	34	104	807,092	6,456,738	NA	106,983	7.9	8	158.9	159,269
1978/79	58	154	797,364	6,395,512	NA	101,117	8.1	8	159.3	63,140
1979/80	46	115	815,557	5,995,231	NA	83,527	7.7	10	155.9	284,555
1980/81	110	258	1,497,101	10,970,346	31,636	167,684	7.3	9	155.7	287,285
1981/82	99	312	1,202,499	9,080,729	25,408	176,168	7.6	7	158.2	250,699
1982/83	122	281	587,908	4,405,353	34,429	127,728	7.5	5	159.8	51,703
1983/84	126	221	276,364	2,193,395	36,439	86,428	7.9	3	159.9	4,562
1984/85	16	25	40,427	306,699	3,122	15,147	7.6	3	155.5	NA
1985/86	26	49	77,607	532,735	6,038	23,483	6.9	3	146.5	7,500
1986/87	16	25	36,988	258,939	4,376	15,800	7.0	2	NA	5,450
1987/88	38	68	95,131	701,337	9,594	40,507	7.4	2	152.7	9,910
1988/89-92/93				F I S H E R Y CLOSED						
1993[f]	112	135	380,217	2,607,634	4,860	35,942	6.9	11	154.4	NA
1994[f]	104	121	167,520	1,338,953	4,675	28,976	8.0	6	162.1	2,929
1995[f]	117	151	107,521	871,173		33,531	8.1	3	162.5	15,316
1995[g]	119	152	172,987	1,267,454		34,721	7.3	5	N/A	46,263
1995[h]	127	162	280,508	2,138,627	5,400	37,643	NA	8		61,579
1996[f]	66	90	25,383	200,304		29,411	7.9	<1	161.0	319
1996[g]	66	92	127,712	937,032		30,607	7.3	4	153.1	14,997
1996[h]	66	92	153,095	1,137,336	2,730	30,607	7.4	3		15,316

-continued-

Table 2-9.-(Page 2 of 2)

Year[a]	Number of Vessels	Number of Landings	Number of Crabs[b]	Harvest[b,c]	Number of Pots Registered	Number of Pots Pulled	Average Weight[c]	Average CPUE[d]	Average Length[e]	Deadloss[c]
1997[f]	53	110	90,641	756,818		28,458	8.4	3	164.3	18,807
1997[g]	51	105	73,745	537,316		27,652	7.5	3	163.6	16,747
1997[h]	53	110	159,244	1,269,192	2,230	30,400	8.0	5		35,554
1998[f]	57	84	68,129	510,365		23,381	7.5	3	158.8	8,703
1998[g]	57	83	68,513	516,996		22,965	7.5	3	156.1	22,289
1998[h]	57	84	136,642	1,027,361	2,398	23,381	7.5	3		30,992
1999-2004					F I S H E R Y	CLOSED				

[a] Blue king crab, 1973 - 1988.
[b] Deadloss included.
[c] In pounds
[d] Number of legal crabs per pot lift.
[e] Carapace length in millimeters.
[f] Red king crab.
[g] Blue king crab.
[h] Blue and red king crab fisheries combined.
NA = Not available.

Table 2-10.-Guideline harvest level (GHL), economic performance and season length summary for the Pribilof District commercial red and blue king crab fishery, 1980/81 - 2004.

		Value		Season Length	
Year[a]	GHL[b]	Exvessel[c]	Total[d]	Days	Dates
1980/81	5.0-8.0	$0.90	$9.6	60	09/15-11/15
1981/82	5.0-8.0	$1.50	$13.6	47	09/10-10/28
1982/83	5.0-8.0	$3.05	$13.4	15	09/10-09/25
1983/84	4.0[e]	$3.00	$6.6	10	09/01-09/11
1984/85	0.5-1.0	$2.50	$0.1	15	09/01-09/16
1985/86	0.3-0.8	$2.90	$1.4	26	09/25-10/21
1986/87	0.3-0.8	$4.05	$1.2	55	09/25-11/20
1987/88	0.3-1.7	$4.00	$2.8	86	09/25-12/20
1988/89-92/93		F I S H E R Y CLOSED			
1993[f]	3.4	$4.98	$13.0	6	09/15-09/21
1994[f]	2.0[e]	$6.45	$8.6	6	09/15-09/21
1995[f]	2.5[h]	$3.37	$2.9	7	09/15-09/22
1995[g]	2.5[h]	$2.92	$3.9	7	09/15-09/22
1996[f]	1.8[h]	$2.76	$0.6	11	09/15-09/26
1996[g]	1.8[h]	$2.65	$2.4	11	09/15-09/26
1997[f]	1.5[h]	$3.09	$2.3	14	09/15-09/29
1997[g]	1.5[h]	$2.82	$1.4	14	09/15-09/29
1998[f]	1.25[h,i]	$2.39	$1.2	13	09/15-09/28
1998[g]	1.25[h,i]	$2.34	$1.2	13	09/15-09/28
1999-2004		F I S H E R Y CLOSED			

[a] Blue king crab, 1980-1988.
[b] Guideline harvest level, millions of pounds.
[c] Average price per pound.
[d] Millions of dollars.
[e] Set not to exceed.
[f] Red king crab.
[g] Blue king crab.
[h] Combined red and blue king crab.
[I] General fishery only.

Table 2-11.-Saint Matthew Island Section commercial blue king crab fishery data, 1977-2004.

Year	Number of Vessels	Number of Landings	Number of Crabs[a]	Harvest[a,b]	Number of Pots Registered	Number of Pots Pulled	Percent Recruits	Average Weight[b]	Average CPUE[c]	Average Length[d]	Deadloss[b]
1977	10	24	281,665	1,202,066		17,370	7	4.3	16	130.4	129,148
1978	22	70	436,126	1,984,251		43,754	NA	4.5	10	132.2	116,037
1979	18	25	52,966	210,819		9,877	81	4.0	5	128.8	128.8
1980					CONFIDENTIAL						
1981	31	119	1,045,619	4,627,761		58,550	NA	4.4	18	NA	53,355
1982	96	269	1,935,886	8,844,789		165,618	20	4.6	12	135.1	142,973
1983	164	235	1,931,990	9,454,323	38,000	133,944	27	4.8	14	137.2	828,994
1984	90	169	841,017	3,764,592	14,800	73,320	34	4.5	11	135.5	31,983
1985	79	103	484,836	2,427,110	13,000	51,606	9	5.0	9	139	2,613
1986	38	43	219,548	1,003,162	5,600	22,093	10	4.6	10	134.3	32,560
1987	61	62	234,521	1,075,179	9,370	28,440	5	4.6	8	134.1	400
1988	46	46	302,053	1,325,185	7,780	10,160	65	4.4	30	133.3	22,358
1989	69	69	247,641	1,166,258	11,983	30,853	9	4.7	8	134.6	3,754
1990	31	38	391,405	1,725,349	6,000	26,264	4	4.4	15	134.3	17,416
1991	68	69	726,519	3,372,066	13,100	37,104	12	4.6	20	134.1	216,459
1992	174	179	544,956	2,474,080	17,400	56,630	9	4.6	10	134.1	0
1993	92	136	629,874	2,999,921	5,895	58,647	6	4.8	11	135.4	0
1994	87	133	827,015	3,764,262	5,685	60,860	60	4.6	14	133.3	46,699
1995	90	111	666,905	3,166,093	5,970	48,560	45	4.8	14	135	90,191
1996	122	189	661,115	3,080,916	8,010	91,205	47	4.7	7	134.6	36,892
1997	117	166	939,822	4,649,660	7,650	81,117	31	4.9	12	139.5	209,490
1998	131	255	612,346	2,868,965	8,561	89,500	46	4.7	7	135.8	14,417
1999-2004					FISHERY CLOSED						

[a] Deadloss included.
[b] In pounds.
[c] Number of legal crabs per pot lift.
[d] Carapace length in millimeters.
NA = Not available.

Table 2-12.-Guideline harvest level (GHL), economic performance and season length summary for the Saint Matthew Island Section commercial blue king crab fishery, 1983-2004.

		Value		Season Length	
Year	GHL[a]	Ex-vessel[b]	Total[c]	Days	Dates
1983	8	$3.00	$25.80	17	08/20-09/06
1984	2.0-4.0	$1.75	$6.50	7	09/01-09/08
1985	0.9-1.9	$1.60	$3.80	5	09/01-09/06
1986	0.2-0.5	$3.20	$3.20	5	09/01-09/06
1987	0.6-1.3	$2.85	$3.10	4	09/01-09/05
1988	0.7-1.5	$3.10	$4.00	4	09/01-09/05
1989	1.7	$2.90	$3.50	3[d]	09/01-09/04
1990	1.9	$3.35	$5.70	6	09/01-09/07
1991	3.2	$2.80	$9.00	4	09/16-09/20
1992	3.1	$3.00	$7.40	3[d]	09/04-09/07
1993	4.4	$3.23	$9.70	6	09/15-09/21
1994	3.0	$4.00	$15.00	7	09/15-09/22
1995	2.4	$2.32	$7.10	5	09/15-09/20
1996	4.3	$2.20	$6.70	8	09/15-09/23
1997	5.0	$2.21	$9.80	7	09/15-09/22
1998	4.0[e]	$1.87	$5.34	11	09/15-09/26
1999-2004		FISHERY CLOSED			

[a] Millions of pounds.

[b] Average price per pound.

[c] Millions of dollars.

[d] Actual length - 60 hours.

[e] General fishery only.

Table 2-13.-Guideline harvest level (GHL), inseason harvest projections and actual commercial harvests for the St. Matthew Island Section blue king crab fishery, 1983-2004.

Year	Guideline Harvest Level[a]	Projected Harvest[a,b]	Actual Harvest[a,c]
1983	8.0	8.0	9.5
1984	2.0 - 4.0	4.0	3.8
1985	0.9 - 1.9	2.0	2.4
1986	0.2 - 0.5	1.0	1.0
1987	0.6 - 1.3	1.3	1.1
1988	0.7 - 1.5	1.5	1.3
1989	1.7	1.7	1.2
1990	1.9	1.9	1.7
1991	3.2	3.2	3.4
1992	3.1	3.1	2.5
1993	4.4	4.4	3.0
1994	3.0	3.0	3.8
1995	2.4	2.4	3.2
1996	4.3	4.3	3.1
1997	5.0	5.0	4.6
1998	4.0[d]	2.9	2.9
1999-2004		FISHERY CLOSED	

[a] Millions of pounds.

[b] Based on inseason catch reports.

[c] Deadloss included.

[d] General fishery only.

Table 2-14.-Commercial harvest of blue king crabs by season for the St. Matthew Island Section, 1977-2004.

Season	Date Opened	Date Closed	Harvest[a]	Minimum Size[b]	Price per Pound
1977	Jun-07	Aug. 16	1,202,066	5 1/2	$1.00
1978	Jul-15	Sept. 3	1,984,251	5 1/2	$0.95
1979	Jul-15	Aug. 24	210,819	5 1/2	$0.70
1980	Jul-15	Sept. 3	CONFIDENTIAL	5 1/2	CONFIDENTIAL
1981	Jul-15	Aug. 21	4,627,761	5 1/2	$0.90
1982	Aug-01	Aug. 16	8,844,789	5 1/2	$2.00
1983[c,d]	Aug-20	Sept. 6[c]	9,506,880[d]	5 1/2	$3.00
1984	Aug-01	Sept. 8	3,764,592	5 1/2	$1.75
1985	Sep-01	Sept. 6	2,427,110	5 1/2	$1.60
1986	Sep-01	Sept. 6	1,003,162	5 1/2	$3.20
1987	Sep-01	Sep-05	1,075,179	5 1/2	$2.85
1988	Sep-01	Sep-05	1,325,185	5 1/2	$3.10
1989	Jan-01	Sep-04	1,166,258	5 1/2	$2.90
1990	Sep-01	Sep-07	1,725,349	5 1/2	$3.35
1991	Sep-16	Sep-20	3,372,066	5 1/2	$2.80
1992	Sep-04	Sep-07	2,474,080	5 1/2	$3.00
1993	Sep-15	Sep-21	2,999,921	5 1/2	$3.23
1994	Sep-15	Sep-22	3,764,262	5 1/2	$4.00
1995	Sep-15	Sep-22	3,166,093	5 1/2	$2.32
1996	Sep-15	Sep-16	3,080,916	5 1/2	$2.20
1997	Sep-15	Sep-22	4,649,660	5 1/2	$2.21
1998	Sep-15	Sep-26	2,868,965	5 1/2	$1.87
1999-2004			F I S H E R Y C L O S E D		

[a] In pounds, deadloss included.

[b] Carapace width in inches.

[c] Part of Northern District open until September 20.

[d] St. Lawrence Island harvest of 52,557 pounds included.

Table 2-15.-Pribilof District golden king crab fishery harvest data, 1981/82 - 2004 seasons.

	Number of					Average			
Season	Vessels	Landings	Crabs[a]	Pots lifted	Harvest[a,b]	Weight[b]	CPUE[c]	Length[d]	Deadloss[b]
1981/82	2			CONFIDENTIAL					
1982/83	10	19	15,330	5,252	69,970	4.6	3	151	570
1983/84	50	115	253,162	26,035	856,475	3.4	10	127	20,041
1984				NO LANDINGS					
1985	1			CONFIDENTIAL					
1986	1			CONFIDENTIAL					
1987	1			CONFIDENTIAL					
1988	2			CONFIDENTIAL					
1989	2			CONFIDENTIAL					
1990				NO LANDINGS					
1991	1			CONFIDENTIAL					
1992	1			CONFIDENTIAL					
1993	5	15	17,643	15,395	67,458	3.8	1	NA	0
1994	3	5	21,477	1,845	88,985	4.1	12	NA	730
1995	7	22	82,456	9,481	341,700	4.1	9	NA	716
1996	6	32	91,947	9,952	329,009	3.6	9	NA	3,570
1997	7	23	43,305	4,673	179,249	4.1	9	NA	5,554
1998	3	9	9,205	1,530	35,722	3.9	6	NA	474
1999	3	9	44,098	2,995	177,108	4.0	15	NA	319
2000	7	19	29,145	5,450	127,217	4.4	5	NA	5,288
2001	6	14	33,723	4,262	145,876	4.3	8	143	8,227
2002	8	20	34,639	5,464	150,434	4.3	6	144	8,984
2003	3	CONFIDENTIAL		2,854	CONFIDENTIAL	4.1	13	139	CONFIDENTIAL
2004	5	CONFIDENTIAL		2,312	CONFIDENTIAL	4.0	15	143	CONFIDENTIAL

[a] Deadloss included.

[b] In pounds.

[c] Number of legal crabs per pot lift.

[d] Carapace length in millimeters.

NA = Not available.

Confidential = Less than three vessels or processors participated in the fishery.

Table 2-16.-Pribilof District golden king crab fishery economic data, 1991-2004 seasons.

		Value		Season Length	
Season	GHL[a]	Ex-vessel[b]	Total	Days	Dates
1991		CONFIDENTIAL		365	1/1-12/31
1992		CONFIDENTIAL		365	1/1-12/31
1993		$2.42	$163,248	365	1/1-12/31
1994		$3.81	$336,252	365	1/1-12/31
1995		$3.12	$1,056,900	365	1/1-12/31
1996		$2.02	$639,532	365	1/1-12/31
1997		$2.23	$387,340	365	1/1-12/31
1998		$2.06	$72,611	365	1/1-12/31
1999		$2.34	$413,686	162	1/1-6/10
2000	0.2	$3.22	$392,436	365	1/1-12/31
2001	0.15	$3.12	$429,464	105	1/1-4/15
2002	0.15	$3.10	$438,495	134	1/1-5/14
2003	0.15	CONFIDENTIAL		121	1/1-5/1
2004	0.15	CONFIDENTIAL		72	1/1-3/12

[a] Guideline harvest level in millions of pounds.

[b] Average price per pound.

Confidential = Less than three vessels or processors participated in fishery.

Table 2-17.-Saint Matthew Island Section commercial golden king crab fishery harvest data,1982/83 - 2004 seasons.

Season	Number of Vessels	Number of Landings	Number of Crabs[a]	Number of Pots lifted	Harvest[a,b]	Average Weight[b]	Average CPUE[c]	Average Length[d]	Deadloss[b]
1982/83	22	30	51,714	7,825	193,507	3.7	7	138	957
1983/84				NO LANDINGS					
1985				NO LANDINGS					
1986				NO LANDINGS					
1987	11	29	101,618	14,525	424,394	4.2	7	142	11,750
1988	11	23	36,270	11,672	160,441	4.4	3	150	14,000
1989	2			CONFIDENTIAL					
1990				NO LANDINGS					
1991				NO LANDINGS					
1992	1			CONFIDENTIAL					
1993				NO LANDINGS					
1994	1			CONFIDENTIAL					
1995	4	4	245	383	1,200	4.9	1	NA	0
1996	1			CONFIDENTIAL					
1997-2000				NO LANDINGS					
2001	1			CONFIDENTIAL					
2002				NO LANDINGS					
2003	1			CONFIDENTIAL					
2004				NO LANDINGS					

[a] Deadloss included.

[b] In pounds.

[c] Number of legal crabs per pot lift.

[d] Carapace length in millimeters.

NA = Not available.

Confidential = Less than three vessels or processors participated in the fishery.

Table 2-18.-Saint Matthew Island Section commercial golden king crab fishery economic data, 1991-2004 seasons.

	Value		Season Length	
Season	Exvessel[a]	Total	Days	Dates
1991	NO LANDINGS		365	1/1-12/31
1992	CONFIDENTIAL		365	1/1-12/31
1993	NO LANDINGS		365	1/1-12/31
1994	CONFIDENTIAL		365	1/1-12/31
1995	$3.12	$3,744	365	1/1-12/31
1996	CONFIDENTIAL		365	1/1-12/31
1997-2000	NO LANDINGS		365	1/1-12/31
2001	CONFIDENTIAL		365	1/1-12/31
2002	NO LANDINGS		365	1/1-12/31
2003	CONFIDENTIAL		365	1/1-12/31
2004	NO LANDINGS		365	1/1-12/31

[a] Average price per pound.

Confidential = Less than three vessels or processors participated in the fishery.

Table 2-19.-King crab Registration Area Q commercial scarlet king crab fishery data, 1992-2004.

	Number of			Average		Value		
Year	Vessels	Pots Lifted	Harvest[a,b]	Weight[a]	CPUE[c]	Ex-vessel[d]	Total[e]	Deadloss[a]
1992-94			NO LANDINGS					
1995	4	24,551	26,684	2.4	1	$2.12	$0.06	465
1996	2		CONFIDENTIAL					
1997- 99			NO LANDINGS					
2000[f]	1		CONFIDENTIAL					
2001[f]	1		CONFIDENTIAL					
2002[f]			NO LANDINGS					
2003[f]	1		CONFIDENTIAL					
2004	3		CONFIDENTIAL					

[a] In pounds.

[b] Deadloss included.

[c] Number of legal crabs per pot lift.

[d] Average price per pound.

[e] Millions of dollars.

[f] Restricted to incidental harvest during Bering Sea golden king and grooved Tanner crab fisheries.

Confidential = Less than three vessels or processors participated in fishery.

Table 2-20.-Bering Sea District commercial Tanner crab fishery harvest data, 1969-2004.

	Number of				Number of Pots			
Year	Vessels	Landings	Crabs[a]	Harvest[a,b]	Registered	Pulled	CPUE[c]	Deadloss[b]
1969	NA	131	353,300	1,008,900	NA	29,800	12	NA
1970	NA	66	482,300	1,014,700	NA	16,400	29	NA
1971	NA	22	61,300	166,100	NA	7,300	8	NA
1972	NA	14	42,061	107,761	NA	4,260	10	NA
1973	NA	44	93,595	231,668	NA	15,730	6	NA
1974	NA	69	2,531,825	5,044,197	NA	22,014	115	NA
1974/75	28	80	2,773,770	7,028,378	NA	38,462	72	NA
1975/76	66	304	8,956,036	22,358,107	NA	141,206	63	NA
1976/77	83	541	20,251,508	51,455,221	NA	297,471	68	NA
1977/78	120	861	26,350,688	66,648,954	NA	516,350	51	218,099
1978/79	144	817	16,726,518	42,547,174	NA	402,697	42	76,000
1979/80	152	804	14,685,611	36,614,315	40,273	488,434	30	56,446
1981	165	761	11,845,958	29,630,492	42,910	559,626	21	101,594
1982	125	791	4,830,980	11,008,779	36,396	490,099	10	138,159
1983	108	448	2,286,756	5,273,881	15,255	282,006	8	60,029
1984	41	134	516,877	1,208,223	9,851	61,357	8	5,025
1985	44	166	1,283,474	3,151,498	15,325	104,707	12	14,096
1986				FISHERY CLOSED				
1987				FISHERY CLOSED				
1988	98	248	897,059	2,210,394	38,765	112,334	8	10,724
1989	109	359	2,907,021	7,012,965	43,607	184,892	16	34,664
1990	179	1,032	10,717,924	24,549,299	46,440	711,137	15	87,475
1990/91	255	1,756	16,608,625	40,081,555	75,356	883,391	19	210,769
1991/92	285	2,339	12,924,034	31,796,381	85,401	1,244,633	10	279,741

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Table 2-20.-(page 2 of 2)

Year	Number of Vessels	Number of Landings	Number of Crabs[a]	Harvest[a,b]	Number of Pots Registered	Number of Pots Pulled	CPUE[c]	Deadloss[b]
1992/93	294	2,084	15,265,880	35,130,866	71481	1,200,885	13	343,955
1993/94	296	862	7,235,498	16,891,320	116,039	576,464	13	258,389
1994	183	349	3,351,639	7,766,886	38,670	249,536	13	132,780
1995	196	256	1,877,303	4,233,061	40,827	247,853	8	44,508
1996[d]	196	347	734,296	1,806,077	68,602	149,289	5	14,608
1997 to 2004				FISHERY CLOSED				

[a] Deadloss included.

[b] In pounds.

[c] Number of legal crabs per pot lift.

[d] Includes incidental catch with Bristol Bay red king crab and Tanner crab directed fishery totals.

NA = Not available.

Table 2-21.-Bering Sea District commercial Tanner crab fishery catch by subdistrict, 1974/75-2004.

		Number of					Average		
Season	Subdistrict[a]	Vessels	Landings	Crabs[b]	Pots Lifted	Harvest[b,c]	Weight[c]	CPUE[d]	Deadloss[c]
1974/75	Southeastern		72	2,526,687	32,275	6,504,984	2.6	78	0
	Pribilofs		8	247,083	3,923	523,394	2.1	63	0
	TOTAL	28	80	2,773,770	38,462	7,028,378	2.5	72	0
1975/76	Southeastern		230	6,682,232	106,445	16,643,194	2.5	63	0
	Pribilofs		74	2,273,804	34,761	5,714,913	2.5	65	0
	TOTAL	66	304	8,956,036	141,206	22,358,107	2.5	63	0
1976/77	Southeastern		437	16,089,057	233,667	41,007,736	2.6	69	0
	Pribilofs		104	4,162,451	63,804	10,447,485	2.5	65	0
	TOTAL	83	541	20,251,508	297,471	51,455,221	2.5	68	0
1977/78	Southeastern		706	21,055,527	408,437	53,278,012	2.5	52	0
	Pribilofs		155	5,210,170	107,913	13,152,843	2.5	48	0
	TOTAL	120	861	26,350,688	516,350	66,648,954	2.5	51	218,099
1978/79	Southeastern		758	15,601,891	356,594	39,694,205	2.5	44	75,400
	Pribilofs		59	1,124,627	46,103	2,852,969	2.5	24	600
	TOTAL	144	817	16,726,518	402,697	42,547,174	2.5	42	76,000
1979/80	Southeastern		789	14,329,889	476,410	35,724,003	2.5	30	56,446
	Pribilofs		15	355,722	12,024	890,312	2.5	30	0
	TOTAL	152	804	14,685,611	488,434	36,614,315	2.5	30	56,446

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Table 2-21.-(page 2 of 4)

Season	Subdistrict[a]	Number of Vessels	Number of Landings	Number of Crabs[b]	Number of Pots Lifted	Harvest[b,c]	Average Weight[c]	Average CPUE[d]	Deadloss[c]
1981	Southeastern		674	10,532,007	496,751	26,684,956	2.5	21	97,398
	Pribilofs		87	1,313,951	62,875	2,945,536	2.5	21	4,196
	TOTAL	165	761	11,845,958	559,626	29,630,492	2.5	21	101,594
1982	Southeastern		539	3,825,433	322,634	8,812,302	2.3	12	69,829
	Pribilofs		252	1,005,547	167,465	2,196,477	2.2	6	68,330
	TOTAL	125	791	4,830,980	490,099	11,008,779	2.3	10	138,159
1983	Northern		10	29,478	5,950	48,454	1.7	5	167
	Southeastern		287	1,984,673	192,538	4,633,354	2.3	10	52,879
	Pribilofs		151	272,505	83,528	592,073	2.2	3	6,983
	TOTAL	108	448	2,286,756	282,006	5,273,881	2.3	8	60,029
1984	Southeastern		91	470,181	44,546	1,099,142	2.3	11	4,688
	Pribilofs		43	46,759	16,811	109,081	2.3	3	337
	TOTAL	41	134	516,877	61,357	1,208,223	2.3	8	5,025
1985	Southeastern	38	143	1,278,109	96,976	3,139,041	2.4	13	14,096
	Pribilofs	15	23	5,365	7,731	12,457	2.3	1	0
	TOTAL	44	166	1,283,474	104,707	31,513,498	2.4	12	14,096
1986					F I S H E R Y C L O S E D				
1987					F I S H E R Y C L O S E D				

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Table 2-21.-(page 3 of 4)

Season	Subdistrict[a]	Number of Vessels	Number of Landings	Number of Crabs[b]	Number of Pots Lifted	Harvest[b,c]	Average Weight[c]	Average CPUE[d]	Deadloss[c]
1988	Eastern	98	248	897,059	112,334	2,210,394	2.5	8	10,724
	Western	0	0	0	0	0	0	0	0
	TOTAL	98	248	897,059	112,334	2,210,394	2.5	8	10,724
1989	Eastern	109	359	2,907,021	184,892	7,012,965	2.4	16	34,664
	Western	0	0	0	0	0	0	0	0
	TOTAL	109	359	2,907,021	184,892	7,012,965	2.4	16	34,664
1990	Eastern		1,105	10,708,996	701,924	24,529,165	2.3	15	87,475
	Western		17	8,928	9,213	20,134	2.3	1	0
	TOTAL	179	1,032	10,717,924	711,137	24,549,299	2.3	15	87,475
1990/91	Eastern	255	1,756	16,608,625	883,391	40,081,555	2.4	19	210,769
	Western	0	0	0	0	0	0	0	0
	TOTAL	255	1,756	16,608,625	883,391	40,081,555	2.4	19	210,769
1991/92	Eastern	285	2,339	12,924,034	1,244,633	31,796,381	2.5	10	279,741
1992/93	Eastern	293	2,011	15,074,084	1,150,834	34,821,043	2.3	13	340,955
	Western	70	96	191,796	50,051	309,823	1.6	4	3,000
	TOTAL	294	2,084	15,265,880	1,200,885	35,130,866	2.3	13	343,955
1993/94	East of 168°[e]	283	347	1,696,430	250,501	4,114,949	2.4	7	103,715
	163° to 173°[f]	261	515	5,539,068	325,963	12,776,371	2.3	17	154,674
	TOTAL	296	862	7,235,498	576,464	16,891,320	2.3	13	258,389

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Table 2-21.-(page 4 of 4)

Season	Subdistrict[a]	Number of Vessels	Number of Landings	Number of Crabs[b]	Number of Pots Lifted	Harvest[b,c]	Average Weight[c]	Average CPUE[d]	Deadloss[c]
1994	163° to 173°	183	349	3,351,639	249,536	7,766,886	2.3	13	132,780
1995	163° to 173°	196	256	1,877,303	247,853	4,233,061	2.3	8	44,508
1996	East of 168°[e]	192	195	393,257	75,753	994,776	2.5	5	8,464
	163° to 173°[f]	135	152	341,039	73,522	811,301	2.4	5	6,144
	TOTAL	196	347	734,296	149,275	1,806,077	2.5	5	14,608
1997 to 2004				F I S H E R Y C L O S E D					

[a] Prior to 1988, the subdistricts were: Southeastern, Pribilof, and Northern (includes the Norton Sound and General Sections).

[b] Deadloss included.

[c] In pounds.

[d] Number of legal crabs per pot lift.

[e] Incidental harvest in Bristol Bay red king crab fishery.

[f] Directed Tanner crab fishery.

Table 2-22.-Bering Sea District commercial Tanner crab fishery economic data, 1979/80-2004.

		Value		Season Length	
Year	GHL[a]	Exvessel[b]	Total[c]	Days	Dates
1979/80	28-36	$0.52	$19.0	189	11/01-05/11
1981	28-36	$0.58	$17.2	88	01/15-04/15
1982	12-16	$1.06	$11.5	118	02/15-06/15
1983	5.6	$1.20	$6.2	118	02/15-06/15
1984	7.1	$0.95	$1.1	118	02/15-06/15
1985	3	$1.40	$4.3	149	01/15-06/15
1986			FISHERY CLOSED		
1987			FISHERY CLOSED		
1988	5.6	$2.17	$4.8	93	01/15-04/20
1989	13.5	$2.90	$20.3	110	01/15-05/07
1990[d]	29.5	$1.85	$45.3	89	01/15-04/24
1990/91	42.8	$1.12	$44.5	126	11/20-03/25
1991/92	32.8	$1.50	$47.3	137	11/15-03/31
1992/93	39.2	$1.69	$58.8	137	11/15-03/31
1993[e]	10.7	$1.90	$7.6	10	11/01-11/10
1993/94[f]	9.1	$1.90	$24.0	42	11/20-01/01
1994[f]	7.5	$3.75	$28.5	20	11/01-11/21
1995[f]	5.5	$2.80	$11.7	15	11/01-11/16
1996[e]	2.2	$2.51	$2.5	4	11/01-11/05
1996[f]	6.2	$2.48	$2.0	12	11/15-11/27
1997 to 2004			FISHERY CLOSED		

[a] Guideline harvest level, millions of pounds.

[b] Average price per pound.

[c] Millions of dollars.

[d] Winter fishery.

[e] East of 168° West longitude (incidental to Bristol Bay red king crab).

[f] 163° -173° West longitude (directed fishery).

Table 2-23.-Bering Sea District commercial Tanner crab fishery harvest composition by fishing season, 1972-2004.

	Average		% New
Season	Weight[a]	Width[b]	Shell
1972[c]	2.6	NA	NA
1973[c]	2.5	NA	NA
1974[c]	2	NA	NA
1974/75	2.5	NA	NA
1975/76	2.5	NA	NA
1976/77	2.5	NA	NA
1977/78	2.5	152.8	88.0
1978/79	2.5	152.7	95.0
1979/80	2.5	151.4	90.0
1981	2.5	149.4	86.6
1982	2.3	148.8	85.4
1983[d]	2.3	148.8	70.5
1984	2.3	146.5	40.0
1985	2.4	150.0	65.0
1986	FISHERY	CLOSED	
1987	FISHERY	CLOSED	
1988	2.5	143.5	70.2
1989	2.4	149.4	80.8
1990	2.3	148.1	96.5
1990/91	2.4	149.7	95.3
1991/92	2.5	150.4	93.2
1992/93	2.3	148.0	90.5
1993/94	2.4	150.7	93.9
1994	2.3	150.0	92.5
1995	2.3	149.3	58.6
1996[e]	2.5	152.1	46.6
1997 to 2004	FISHERY	CLOSED	

[a] In pounds.

[b] Carapace width in millimeters.

[c] Incidental to Bristol Bay red king crab fishery.

[d] Partial Bering Sea closure.

[e] Includes incidental catch with Bristol Bay red king crab and Tanner crab directed fishery totals.

NA = Not available.

Table 2-24.-Bering Sea District commercial snow crab general fishery harvest data, 1978/79 - 2004.

Year	GHL[a]	Number of Vessels	Landings	Crabs[b]	Pots Lifted	Harvest[b,c]	CPUE[d]	Deadloss[c]
1978/79		102	490	22,118,498	190,746	32,187,039	116	759,137
1979/80		134	597	25,286,777	255,102	39,572,668	99	228,345
1981	39.5-91.0	153	867	34,415,322	435,742	52,750,034	79	2,269,979
1982	16.0-22.0	122	803	24,089,562	469,091	29,355,374	51	1,092,655
1983[e]	15.8	109	461	23,853,647	287,127	26,128,410	83	1,324,466
1984[e]	49.0	52	367	24,009,935	173,591	26,813,074	138	798,795
1985[e]	98.0	75	718	52,903,246	372,045	65,998,875	142	1,064,184
1986[e]	57.0	88	992	76,499,123	543,744	97,984,539	141	1,378,533
1987[e]	56.4	103	1,038	81,307,659	616,113	101,903,388	132	978,449
1988[e]	110.7	171	1,285	105,716,337	776,907	135,354,637	136	3,260,020
1989[e]	132.0	168	1,341	112,618,881	663,442	149,455,848	170	1,844,682
1990[e]	139.8	189	1,565	128,977,638	911,613	161,821,350	141	1,796,664
1991[e]	315.0	220	2,788	265,123,960	1,391,583	328,647,269	191	3,464,036
1992	333.0	250	2,763	227,376,582	1,281,796	315,302,034	177	2,325,852
1993	207.2	254	1,836	169,558,842	971,046	230,787,000	175	1,573,952
1994	105.8	273	1,293	114,779,014	716,524	149,775,765	160	1,799,323
1995	55.7	253	869	60,611,411	506,802	75,252,677	117	1,287,169
1996	50.7	234	766	52,912,823	520,651	65,712,797	102	1,333,014
1997	117.0	226	1,127	99,975,539	754,140	119,543,024	133	2,351,555
1998[f]	225.9	229	1,767	186,543,734	891,268	243,341,381	207	2,893,945
1999[f]	186.2	241	1,630	143,296,568	899,043	184,529,821	158	1,828,313
2000[f]	26.4	229	287	23,265,802	170,064	30,774,838	137	338,057
2001[f]	25.3	207	293	17,185,523	176,930	23,382,046	97	429,884
2002[f]	28.5	191	403	23,303,975	307,666	30,252,501	76	582,589
2003[f,g]	23.7	192	230	21,637,019	139,903	26,341,958	155	665,199
2004[f]	19.3	189	240	17,331,514	110,087	22,170,150	157	224,377

[a] Guideline harvest level, millions of pounds.

[b] Deadloss included.

[c] In pounds.

[d] Number of legal crabs per pot lift.

[e] Partial district and subdistrict closures, see Table 2-26.

[f] General fishery only.

[g] Includes 181,457 pounds illegally taken in Russian waters.

Table 2-25.-Bering Sea District commercial snow crab general fishery season dates and area closures, 1977/78-2004.

Season	Opened	Closed	Comments
1977/78	09/15/77	09/23/78	Bering Sea District closure[a]
1978/79	11/01/78	09/03/79	Bering Sea District closure[a]
1979/80	11/01/79	08/15/80	Bering Sea District state closure
		09/03/80	Bering Sea District federal closure
1981	01/15/81	09/01/81	Bering Sea District closure[b]
1982	02/15/82	08/01/82	Bering Sea District closure[b]
1983	02/15/83	05/22/83	Bering Sea District closure south of 57°30’ N. lat. [b]
		08/01/83	Bering Sea District closure north of 57°30’ N. lat. [b]
1984	02/15/84	08/01/84	Bering Sea District closure south of 58° N. lat.[b]
		08/22/84	Bering Sea District closure north of 58° N. lat. to allow an orderly start to king crab season[b]
	09/15/84	12/31/84	Bering Sea District closure north of 58°N. lat. reopened after king season and Bering Sea District closure[b]
1985	01/15/85	05/08/85	Pribilof Subdistrict closure south of 58° N. lat.[b]
		08/01/85	Bering Sea District closure south of 58°39’ N. lat.[b]
		08/22/85	Northern Subdistrict closure to allow an orderly start to king crab season[b]
	10/09/85	01/15/86	*Bering Sea District reopened, except east of 164° W. long. in Southeastern Subdistrict, *fishery was scheduled to close 12/31/85 but did not, it remained open until the start of the 1986 fishery
1986	01/15/86	04/21/86	Southeastern Subdistrict closure west of 164° W long.[b]
		06/01/86	Pribilof Subdistrict closure[b]
		08/01/86	Northern Subdistrict closure east of 175° W. long.[b]
		08/24/86	Northern Subdistrict closure west of 175° W. long.[b]
1987	01/15/87	04/12/87	Southeastern Subdistrict west of 164° W. long., and Pribilof Subdistrict closure
		06/01/87	Northern Subdistrict south of 60°30’ N lat. and east of 178° W. long. closure

-continued-

Table 2-25.-(page 2 of 2)

Season	Opened	Closed	Comments
1987 (cont.)	01/15/87	06/22/87	Northern Subdistrict north of 60°30’ N lat. and west of 178° W. long. closure
1988	01/15/88	03/29/88	Bering Sea District closure (Western Subdistrict to assist in an orderly closure)
	05/15/88	06/30/88	Western Subdistrict reopen and closure
1989	01/15/89	03/26/89	Eastern Subdistrict closure
		05/07/89	Western Subdistrict closure
1990	01/15/90	04/09/90	Eastern Subdistrict east of 165° W. long. closure
		04/24/90	Eastern Subdistrict west of 165° W. long. closure
		06/12/90	Western Subdistrict closure
1991	01/15/91	05/05/91	Eastern Subdistrict closure
		06/23/91	Western Subdistrict closure
1992	01/15/92	04/22/92	Bering Sea District closure
1993	01/15/93	03/15/93	Bering Sea District closure
1994	01/15/94	03/01/94	Bering Sea District closure
1995	01/15/95	02/17/95	Bering Sea District closure
1996	01/15/96	02/29/96	Bering Sea District closure
1997	01/15/97	03/21/97	Bering Sea District closure
1998	01/15/98	03/20/98	Bering Sea District closure
1999	01/15/99	03/22/99	Bering Sea District closure
2000	04/01/00	04/08/00	Bering Sea District closure
2001	01/15/01	02/14/01	Bering Sea District closure
2002	01/15/02	02/08/02	Bering Sea District closure
2003	01/15/03	01/25/03	Bering Sea District closure
2004	01/15/04	01/23/04	Bering Sea District closure

[a] State managed domestic fishery.
[b] Concurrent state and federal date.

Table 2-26.-2004 Bering Sea snow crab fishery inseason harvest and effort projections.

		Projected					
Date	Report Day	Daily CPUE[a]	Pot lifts	Number of crabs	Daily Harvest[b]	Cumulative harvest[b]	Season CPUE[a]
16-Jan	1	99	4,499	443,922	577,099	577,099	99
17-Jan	2	155	13,836	2,148,782	2,793,416	3,370,515	141
18-Jan	3	169	14,046	2,329,378	3,028,192	6,398,707	152
19-Jan	4	163	12,488	2,001,438	2,601,870	9,000,577	154
20-Jan	5	144	12,744	1,819,733	2,365,653	11,366,230	152
21-Jan	6	117	12,686	1,498,136	1,947,577	13,313,807	146
22-Jan	7	122	13,875	1,683,012	2,187,916	15,501,723	142
23-Jan	8	134	13,535	1,811,307	2,354,699	17,856,422	141
24-Jan	9	130	13,443	1,722,690	2,239,497	20,095,919	139
Totals			111,152	15,458,399	20,095,919		139

[a] Number of legal crabs per pot lift.

[b] In pounds.

Table 2-27.-Bering Sea District commercial snow crab harvest by season and subdistrict, 1977/78 - 2004.

Season	Subdistrict	Number of Vessels	Landings[a]	Crabs[b]	Pots Lifted	Harvest[b,c]	Average Weight[c]	CPUE[d]	Deadloss[c]
1977/78	Southeastern		33	1,063,872	11,560	1,439,959	1.4	92	NA
	Pribilof		5	203,674	1,687	276,165	1.4	121	NA
	TOTAL	15	38	1,267,546	13,247	1,716,124	1.4	96	NA
1978/79	Southeastern	101	476	21,279,794	184,491	31,102,832	1.5	115	659,137
	Pribilof	10	14	838,704	6,225	1,084,039	1.5	135	100,000
	TOTAL	102	490	22,118,498	190,746	32,187,039	1.5	116	759,137
1979/80	Southeastern	133	561	23,199,446	237,375	36,406,391	1.6	98	187,945
	Pribilof	19	36	2,087,331	17,727	3,166,777	1.5	118	40,400
	TOTAL	134	597	25,286,777	255,102	39,572,668	1.6	99	228,345
1981	Southeastern		624	24,498,642	309,304	37,866,229	1.6	79	1,475,078
	Pribilof		243	9,916,617	126,438	14,886,705	1.5	78	794,901
	TOTAL	153	867	34,415,322	435,742	52,750,034	1.5	79	2,269,979
1982	Southeastern		468	10,207,174	257,193	13,079,583	1.3	40	422,979
	Pribilof		335	13,882,388	211,898	16,276,421	1.2	66	669,676
	TOTAL	122	803	24,089,562	469,091	29,355,374	1.2	51	1,092,655
1983	Southeastern		153	3,553,281	94,470	4,197,304	1.2	38	165,298
	Pribilof		239	19,076,553	153,458	20,514,000	1.0	124	1,078,643
	Northern		69	1,223,813	39,199	1,417,106	1.1	31	80,525
	TOTAL	109	461	23,853,647	287,127	26,128,410	1.1	83	1,324,466

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Table 2-27.-(page 2 of 5)

Season	Subdistrict	Number of Vessels	Landings[a]	Crabs[b]	Pots Lifted	Harvest[b,c]	Average Weight[c]	CPUE[d]	Deadloss[c]
1984	Southeastern		76	3,534,370	33,091	3,990,621	1.1	107	54,678
	Pribilof		230	17,909,096	112,078	19,727,493	1.1	160	708,706
	Northern		61	2,566,469	28,422	3,094,960	1.2	90	35,411
	TOTAL	52	367	24,009,935	173,591	26,813,074	1.1	138	798,795
1985	Southeastern	55	301	21,963,882	158,819	27,373,232	1.4	138	461,001
	Pribilof	60	301	24,089,526	142,937	29,804,093	1.2	169	505,146
	Northern	24	116	6,849,838	70,289	8,821,550	1.3	97	98,037
	TOTAL	75	718	52,903,246	372,045	65,998,875	1.3	142	1,064,184
1986	Southeastern	47	112	8,491,694	63,889	10,957,578	1.3	133	44,755
	Pribilof	80	508	39,851,767	281,337	50,525,150	1.3	142	472,342
	Northern	67	372	28,155,662	198,518	36,501,811	1.3	142	861,436
	TOTAL	88	992	76,499,123	543,744	97,984,539	1.3	141	1,378,533
1987	Southeastern	28	64	4,116,778	24,619	5,106,473	1.2	167	24,619
	Pribilof	94	458	38,604,802	261,337	47,676,734	1.2	148	261,337
	Northern	99	516	38,586,079	330,157	49,120,181	1.2	117	330,157
	TOTAL	103	1,038	81,307,659	616,113	101,903,388	1.2	132	978,449
1988	Eastern	162	770	59,811,702	431,310	75,781,258	1.3	139	775,104
	Western	151	515	45,904,635	335,597	58,278,927	1.3	137	2,484,916
	TOTAL	171	1,285	105,716,337	776,907	134,060,185	1.3	136	3,260,020
1989	Eastern	163	871	77,698,698	391,451	104,399,693	1.3	198	1,128,971
	Western	127	470	34,920,183	271,991	45,056,155	1.3	128	715,711
	TOTAL	168	1,341	112,618,881	663,442	149,455,848	1.3	170	1,844,682

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Table 2-27.-(page 3 of 5)

Season	Subdistrict	Number of Vessels	Landings[a]	Crabs[b]	Pots Lifted	Harvest[b,c]	Average Weight[c]	CPUE[d]	Deadloss[c]
1990	Eastern	177	956	76,331,829	512,259	94,831,897	1.2	149	1,010,755
	Western	152	659	52,645,809	399,354	66,989,453	1.3	132	785,909
	TOTAL	189	1,565	128,977,638	911,613	161,821,350	1.3	141	1,796,664
1991	Eastern	218	2,013	190,139,612	912,751	240,090,666	1.3	208	1,593,021
	Western	186	867	74,984,348	478,832	88,556,603	1.2	157	1,871,015
	TOTAL	220	2,788	265,123,960	1,391,583	328,647,269	1.2	191	3,464,036
1992	Eastern	250	N/A	217,375,564	1,228,280	302,363,005	1.4	177	2,268,467
	Western	55	N/A	10,001,018	53,516	12,939,029	1.3	187	57,385
	TOTAL	250	2,763	227,376,582	1,281,796	315,302,034	1.4	177	2,325,852
1993	Eastern	251	1,384	110,760,099	675,996	151,328,721	1.4	164	1,108,520
	Western	185	633	58,798,743	295,050	79,458,279	1.4	199	465,432
	TOTAL	254	1,836	169,558,842	971,046	230,787,000	1.4	175	1,573,952
1994	Eastern	220	820	56,012,017	375,928	72,008,424	1.3	149	901,674
	Western	171	586	58,766,997	340,596	77,767,341	1.3	173	897,649
	TOTAL	273	1,293	114,779,014	716,524	149,775,765	1.3	160	1,799,323
1995	Eastern	217	627	32,630,348	313,910	39,736,986	1.2	104	657,051
	Western	153	357	27,981,063	192,892	35,515,691	1.3	145	630,118
	TOTAL	253	869	60,611,411	506,802	75,252,677	1.2	120	1,287,169
1996	Eastern	161	462	23,676,069	252,227	28,244,924	1.2	94	555,118
	Western	146	351	29,236,754	268,424	37,467,873	1.3	109	777,896
	TOTAL	234	766	52,912,823	520,651	65,712,797	1.2	102	1,333,014

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Table 2-27.-(page 4 of 5)

Season	Subdistrict	Number of Vessels	Number of Landings[a]	Number of Crabs[b]	Number of Pots Lifted	Harvest[b,c]	Average Weight[c]	Average CPUE[d]	Deadloss[c]
1997	Eastern	225	1,040	88,486,602	649,319	105,648,771	1.2	136	2,115,217
	Western	83	164	11,488,937	104,821	13,894,253	1.2	110	236,338
	TOTAL	226	1,127	99,975,539	754,140	119,543,024	1.2	133	2,351,555
1998[e]	Eastern	228	1,724	177,781,444	855,393	232,485,209	1.3	205	2,787,292
	Western	44	88	8,762,290	35,875	10,856,172	1.2	242	106,653
	TOTAL	229	1,767	186,543,734	891,268	243,341,381	1.3	207	2,893,945
1999[e]	Eastern	236	1,386	102,209,222	656,276	134,135,696	1.3	156	1,237,770
	Western	121	388	39,646,982	242,767	48,565,812	1.2	163	590,543
	TOTAL	241	1,630	141,856,204	899,043	182,701,508	1.3	158	1,828,313
2000[e]	Eastern	168	217	15,269,109	110,127	20,941,389	1.4	139	200,748
	Western	82	91	7,996,693	59,937	9,833,449	1.2	133	137,309
	TOTAL	229	287	23,265,802	170,064	30,774,838	1.3	137	338,057
2001[e]	Eastern	163	219	8,877,103	114,044	12,575,815	1.4	78	224,266
	Western	85	115	8,308,420	62,866	10,806,231	1.3	132	205,618
	TOTAL	207	293	17,185,523	176,910	23,382,046	1.4	97	429,884
2002[e]	Eastern	144	274	10,369,137	161,736	13,513,988	1.3	64	296,854
	Western	107	191	12,909,073	145,330	16,707,594	1.3	89	283,716
	TOTAL[f]	191	403	23,303,975	307,666	30,252,501	1.3	76	580,570

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Table 2-27.-(page 5 of 5)

Season	Subdistrict	Number of Vessels	Number of Landings[a]	Number of Crabs[b]	Number of Pots Lifted	Harvest[b,c]	Average Weight[c]	Average CPUE[d]	Deadloss[c]
2003[e]	Eastern	66	102	3,931,327	29,305	4,856,607	1.2	134	106,594
	Western	158	155	17,705,692	110,598	21,485,351	1.2	160	558,605
	TOTAL[g]	192	257	21,637,019	139,903	26,341,958	1.2	155	665,199
2004[e]	Eastern	59	75	2,127,631	16,539	2,764,695	1.3	129	28,211
	Western	170	209	15,203,883	93,548	19,405,455	1.3	163	196,166
	TOTAL	189	240	17,331,514	110,087	22,170,150	1.3	157	224,377

[a] Number of subdistrict landings is greater than the total number of vessel landings because a single vessel may fish in several statistical areas.

[b] Deadloss included.

[c] In pounds.

[d] Number of legal crabs per pot lift.

[e] General fishery only.

[f] Total harvest includes 30,919 pounds taken from an unidentified statistical area.

[g] Includes 181,457 pounds illegally taken in Russian waters.

NA = Not Available.

Table 2-28.-Bering Sea District commercial snow crab fishery catch by statistical area, 2004.

Area	Number of Landings[a]	Number of Crabs[b]	Number of Pots Lifted	Harvest[b,c]	Average Weight[c]	Average CPUE[d]	Deadloss[c]
EASTERN SUBDISTRICT AREAS							
715630	10	312,578	1,810	401,501	1.3	173	2,408
725630	15	452,519	4,114	576,941	1.3	110	3,809
725700	22	486,732	4,206	648,735	1.3	116	9,681
725730	21	484,926	3,607	633,154	1.3	134	9,096
725800	13	252,375	1,852	325,109	1.3	136	1,490
Other[e]	6	138,501	950	179,255	1.3	146	1,727
Subtotal	75	2,127,631	16,539	2,764,695	1.3	129	28,211
WESTERN SUBDISTRICT AREAS							
735630	4	130,404	1,040	166,290	1.3	125	936
735700	37	1,417,886	10,131	1,798,956	1.3	140	21,932
735730	54	2,118,019	13,996	2,687,167	1.3	151	22,667
735800	116	7,181,556	45,245	9,065,428	1.3	159	91,277
735830	24	962,461	5,998	1,220,218	1.3	160	9,238
745800	17	538,959	3,035	659,907	1.2	178	8,484
745830	10	292,033	1,569	357,402	1.2	186	2,034
755830	4	167,559	765	226,269	1.4	219	201
775930	3	616,908	1,646	746,903	1.2	375	9,297
776030	3	232,353	1,098	328,640	1.4	212	4,836
776100	4	16,824	128	24,382	1.4	131	230
786000	6	194,601	1,272	275,598	1.4	153	3,837
786030	12	692,633	4,062	1,002,900	1.4	171	9,570
Other[f]	16	641,687	3,563	845,395	1.3	180	11,627
Subtotal	209	15,203,883	93,548	19,405,455	1.3	163	196,166
Total[g]	240	17,331,514	110,087	22,170,150	1.3	157	224,377

[a] Number of statistical area landings is greater than the total number of vessel landings because a single vessel may fish in several statistical areas.

[b] Deadloss included.

[c] In pounds.

[d] Number of legal crabs per pot lift.

[e] Includes 4 statistical areas where less than three vessels made landings.

[f] Includes 10 statistical areas where less than three vessels made landings.

[g] General fishery only.

Table 2-29.-Bering Sea District commercial snow crab fishery economic data 1979/80 - 2004.

Year	Value		Registered	Season
	Ex-vessel[a]	Total[b]	Pots[c]	Length[d]
1979/80	$0.21	$ 82.50	35,503	307
1981	$0.26	$ 13.10	39,789	229
1982	$0.73	$ 20.70	35,522	167
1983[e]	$0.35	$ 8.70	15,396	120
1984[e]	$0.30	$ 7.80	12,493	320
1985[e]	$0.30	$ 19.50	15,325	333
1986[e]	$0.60	$ 60.00	13,750	252
1987[e]	$0.75	$ 75.70	19,386	158
1988[e]	$0.77	$ 100.70	38,765	120
1989[e]	$0.75	$ 110.70	43,607	112
1990[e]	$0.64	$ 102.30	46,440	148
1991[e]	$0.50	$ 162.60	76,056	159
1992	$0.50	$ 156.50	77,858	97
1993	$0.75	$ 171.90	65,081	59
1994	$1.30	$ 192.40	54,837	45
1995	$2.43	$ 180.00	53,707	33
1996	$1.33	$ 85.60	50,169	45
1997	$0.79	$ 92.60	47,036	65
1998[f]	$0.56	$ 134.65	47,909	64
1999[f]	$0.88	$ 160.78	50,173	66
2000[f]	$1.81	$ 55.09	43,407	7
2001[f]	$1.53	$ 32.12	40,379	30
2002[f]	$1.49	$ 44.20	37,807	24
2003[f]	$1.83	$ 46.98	20,452	9
2004[f]	$2.05	$ 44.99	14,444	8

[a] Average price per pound.
[b] Millions of dollars.
[c] Prior to 1992 includes Tanner crab gear.
[d] In days.
[e] Partial district and subdistrict closures, see Table 2-27.
[f] General fishery only.

Table 2-30.-Bering Sea District commercial snow crab fishery harvest composition by fishing season, 1978/79 - 2004.

Season	Average		Percent new	Percent <102 mm cw
	Weight[a]	Width[b]	shell	landed
1978/79	1.5	113.1	83.0	NA
1979/80	1.6	118.1	90.0	NA
1981	1.5	117.0	79.2	NA
1982	1.2	109.4	78.0	NA
1983[c]	1.1	NA	NA	NA
1984[c]	1.1	105.4	78.0	NA
1985[c]	1.3	108.0	80.0	NA
1986[c]	1.3	109.5	73.7	NA
1987[c]	1.2	108.9	84.0	NA
1988[c]	1.3	109.5	71.2	NA
1989[c]	1.3	111.2	85.2	NA
1990[c]	1.3	109.1	97.4	NA
1991[c]	1.2	110.2	95.1	NA
1992	1.4	111.7	97.6	NA
1993	1.4	111.6	92.5	NA
1994	1.3	110.4	93.1	11.3
1995	1.2	108.6	89.6	17.2
1996	1.2	107.5	75.8	19.7
1997	1.2	107.3	96.5	17.3
1998[d]	1.3	111.1	97.0	7.3
1999[d]	1.3	110.3	97.7	8.0
2000[d]	1.3	111.3	95.2	6.5
2001[d]	1.4	111.3	95.2	5.3
2002[d]	1.3	110.4	69.0	12.2
2003[d]	1.2	107.2	83.8	10.2
2004[d]	1.3	110.4	86.0	10.2

[a] In pounds.

[b] Carapace width in millimeters.

[c] Partial district and subdistrict closures, see Table 2-27.

[d] General fishery only.

NA = Not available.

Table 2-31.-Bering Sea District commercial grooved Tanner crab fishery harvest data, 1992-2004.

Year	Number of			Harvest[a,b]	Average		Value		Deadloss[b]
	Vessels	Crabs[a]	Pots Lifted		Weight[b]	CPUE[c]	Ex-vessel[d]	Total[e]	
1992				CONFIDENTIAL					
1993	6	346,735	35,650	658,796	1.9	10	$0.94	$0.60	71,000
1994	4	166,227	13,739	332,454	2.0	12	$1.20	$0.40	30,585
1995	8	478,915	60,993	1,005,721	2.1	8	$1.40	$1.31	69,177
1996	3	50,898	14,504	106,886	2.1	4	$1.08	$0.10	11,186
1997-1999				NO LANDINGS					
2000	1			CONFIDENTIAL					
2001	1			CONFIDENTIAL					
2002				NO LANDINGS					
2003	1			CONFIDENTIAL					
2004	4			CONFIDENTIAL					

[a] Deadloss included.
[b] In pounds.
[c] Number of legal crabs per pot lift.
[d] Average price per pound.
[e] Millions of dollars.

Table 2-32.-Bering Sea District commercial triangle Tanner crab fishery harvest data, 1992-2004.

	Number of				Average		Value		
Year	Vessels	Crabs[a]	Pots Lifted	Harvest[a,b]	Weight[b]	CPUE[c]	Exvessel[d]	Total[e]	Deadloss[b]
1992-1994				NO LANDINGS					
1995	4	41,914	22,180	49,007	1.2	1	$1.35	$0.05	14,147
1996	1			CONFIDENTIAL					
1997-1999				NO LANDINGS					
2000[f]	1			CONFIDENTIAL					
2001[f]	1			CONFIDENTIAL					
2002[f]				NO LANDINGS					
2003[f]	1			CONFIDENTIAL					
2004[f]	4			CONFIDENTIAL					

[a] Deadloss included.

[b] In pounds.

[c] Number of legal crabs per pot lift.

[d] Average price per pound.

[e] Millions of dollars.

[f] Restricted to incidental harvest during grooved Tanner crab fishery.

Confidential = Less than three vessels or processors participated in the fishery.

Table 2-33.-Bering Sea commercial hair crab fishery data, 1979-2004.

	Number of				Pots		Average		
Year	Vessels	Landings	Crabs[a]	Harvest[a,b]	Registered	Pulled	Weight[b]	CPUE[c]	Deadloss[b]
1979	11	16	2,457	5,213		9,908	2.1	<1	0
1980	9	17	25,417	53,914		14,506	2.1	2	0
1980/81	67	192	1,127,309	2,439,483		172,695	2.2	7	265,369
1981/82	48	159	466,560	932,584		117,518	2.0	4	29,749
1982/83	52	161	575,453	1,211,420		84,346	2.1	7	122,456
1983/84	19	48	200,670	406,538		20,414	2.0	10	28,062
1984[d]	7	26	197,209	396,630		22,392	2.0	9	19,436
1985[d]	3	9	34,410	66,042		3,905	2.0	9	593
1986	3	7	7,289	14,835		4,720	2.0	2	500
1987[e]	2				CONFIDENTIAL				
1988-90[d]					NO LANDINGS				
1991[d]	7	42	441,533	377,708		44,444	.9	10	0
1992[d,e]	9	20	203,758	240,767		38,808	1.2	5	11,495
1992[d,f]	10	47	1,127,948	1,198,590		125,943	1.1	9	65,674
1993[d,e]	4	5	2,347	3,038		9,345	1.3	<1	0
1993/94[d,f,g,h]	19	129	1,936,795	2,331,686		585,913	1.2	3	124,596
1994[d,f]	10	55	897,070	1,199,246	13,350	287,954	1.3	3	49,275
1995[d,f]	21	81	1,485,097	2,059,988	25,750	441,494	1.4	3	73,882

-continued-

Table 2-33.-(Page 2 of 2)

Year	Number of Vessels	Landings	Crabs[a]	Harvest[a,b]	Pots Registered	Pulled	Average Weight[b]	CPUE[c]	Deadloss
1996[d]	19	99	485,735	745,804	20,680	410,548	1.5	1	32,495
1997[d]	16	52	420,121	668,096	18,180	211,970	1.6	2	17,522
1998[d]	12	31	188,784	307,739	14,330	128,495	1.6	2	17,392
1999[d]	8	27	139,894	221,656	9,840	92,333	1.6	1	4,677
2000[d]	3	3	1,058	1,546	3,900	3,300	1.5	<1	0
2001-2004[d]					FISHERY CLOSED				

[a] Deadloss included.

[b] In pounds.

[c] Number of legal crabs per pot lift.

[d] Permit Fishery.

[e] Spring Fishery.

[f] Fall Fishery.

[g] Fishery opened Nov. 1, 1993 and closed April 20, 1994.

[h] Includes seven vessels that landed hair crab incidental to Tanner crab.

Confidential = Less than three vessels or processors participated in fishery.

Table 2-34.-Bering Sea commercial hair crab fishery economic performance data, 1979-2004.

		Value		Season	
Year	GHL[a]	Ex-vessel[b]	Total[c]	Days	Dates
1979		$0.54	$.003	257	04/19-12/31
1980		$0.75	$0.04	244	01/01-08/30
1980/81		$0.80	$1.7	242	11/01-06/30
1981/82		$0.55	$0.5	288	11/01-08/15
1982/83		$0.65	$0.7	297	10/08-08/01
1983/84		$1.20	$0.5	335	08/01-06/30
1984		$1.60	$0.6	184	07/01-12/31
1985		$1.60	$0.1	365	01/01-12/31
1986		$1.15	$0.2	365	01/01-12/31
1987		CONFIDENTIAL		365	01/01-12/31
1988-90		NO LANDINGS		365	01/01-12/31
1991		$3.08	$1.2	365	01/01-12/31
1992		$2.25	$0.5	32	01/01-06/04
1992		$2.46	$2.8	156	10/01-11/01
1993		NA	NA	45	04/01-05/15
1993/94	3.0	$2.42	$5.3	171	11/01-04/20
1994	1.1	$3.55	$4.0	41	11/01-12/12
1995	1.8	$2.87	$5.7	25	11/01-11/26
1996	0.9	$2.65	$1.9	31	11/01-12/02
1997	0.8	$2.97	$1.9	25	11/01-11/25
1998	0.4	$2.70	$0.8	16	10/08-10/23
1999	0.3	$3.20	$0.7	37	10/30-12/07
2000	0.3	$3.84	$0.005	7	10/30-11/05
2001-2004			FISHERY CLOSED		

[a] Guideline harvest level, millions of pounds.

[b] Average price per pound.

[c] Millions of dollars.

NA = Not available.

Table 2-35.-Bering Sea commercial octopus incidental harvest in groundfish fisheries, 1995-2004.

	Number of		Harvest[b]	
Year	Vessels	Landings[a]	Total[c]	Landed
1995[d]	30	76	17,730	11,967
1996	38	104	27,226	5,337
1997	27	47	12,232	6,997
1998	30	48	9,542	3,855
1999	7	8	6,961	376
2000	50	128	39,944	16,303
2001	62	163	50,947	8,982
2002	70	185	56,179	39,466
2003	78	237	122,423	94,462
2004	91	190	86,757	61,230

[a] All landings incidental to other fisheries.
[b] Numbers from state groundfish fish tickets (Neptune database), in pounds.
[c] Discards at sea included.
[d] The 1995 directed fishery data is confidential, and is not included in this table.

Table 2-36.-Bering Sea commercial snail catch data, 1992 - 2004.

Year	Number of Vessels	Number of Landings	Number of Pots Registered	Number of Pots Pulled	Harvest[a,b]	CPUE[c]	Pounds Per Pot[d]	Deadloss[b]
1992				CONFIDENTIAL				
1993	4	10	13,800	44,686	312,876	25	7	NA
1994	4	42	14,850	279,349	2,027,328	21	7.3	62,571
1995	4	38	18,800	262,096	2,352,825	28	9	22,371
1996	5	67	31,300	741,326	3,572,992	16	4.8	62,494
1997	3	17	14,500	191,893	932,048	16	4.9	77,131
1998-2004				NO LANDINGS				

[a] Deadloss included.
[b] In pounds.
[c] Number of snails per pot pull.
[d] Whole weight.
NA = Not applicable.
Confidential = Less than three vessels or processors participated in fishery.

Table 2-37.-Bering Sea commercial snail fishery economic performance data, 1992-2004.

Year	Harvest[a]	Number of Vessels	Number of Landings	Value Exvessel[b]	Value Total
1992			CONFIDENTIAL		
1993	312,876	4	10	$0.40	$125,150
1994	1,964,757	4	42	$0.34	$668,017
1995	2,330,454	4	38	$0.30	$699,136
1996	3,510,498	5	67	$0.30	$1,053,149
1997	854,917	3	17	$0.36	$307,770
1998-2004			NO LANDINGS		

[a] In pounds.
[b] Average price per pound.
Confidential = Less than three vessels or processors participated in fishery.

Table 2-38.-North Peninsula District commercial Dungeness crab fishery data, 1992-2004.

	Number of				Average		Value		
Year	Vessels	Crabs[a]	Pots Lifted	Harvest[a,b]	Weight[b]	CPUE[c]	Exvessel[d]	Total[e]	Deadloss[b]
1992			NO LANDINGS						
1993	2		CONFIDENTIAL						
1994	2		CONFIDENTIAL						
1995	6	63,732	34,499	134,407	2.1	4	$1.32	$0.18	367
1996	1		CONFIDENTIAL						
1997	2		CONFIDENTIAL						
1998	1		CONFIDENTIAL						
1999			NO LANDINGS						
2000	1		CONFIDENTIAL						
2001			NO LANDINGS						
2002	3		CONFIDENTIAL						
2003			NO LANDINGS						
2004	1		CONFIDENTIAL						

[a] Deadloss included.
[b] In pounds.
[c] Number of legal crabs per pot pull.
[d] Average price per pound.
[e] Millions of dollars.
Confidential = Less than three vessels or processors participated in fishery.

Table 2-39.-The 2003-2005 Community Development Quota (CDQ) Program percent allocation by fishery to each participating CDQ group.

Fishery	Group[a]					
	APICDA	BBEDC	CBSFA	CVRF	NSEDC	YDFDA
Bristol Bay Red King Crab	17	19	10	18	18	18
Pribilof Red & Blue King Crab	0	0	100	0	0	0
St. Mathew Blue King Crab	50	12	0	12	14	12
Norton Sound Red King Crab	0	0	0	0	50	50
Bering Sea Tanner Crab	10	19	19	17	18	17
Bering Sea Snow Crab	8	20	20	17	18	17

[a] APICDA (Aleutian Pribilof Island Community Development Association).
BBEDC (Bristol Bay Economic Development Corporation).
CBSFA (Central Bering Sea Fishermen's Association).
CVRF (Coastal Villages Region Fund).
NSEDC (Norton Sound Economic Development Corporation).
YDFDA (Yukon Delta Fisheries Development Association).

Table 2-40.-The 1998-2004 Community Development Quota (CDQ) Program crab fisheries statistics.

Fishery	Allocation[a]	Number of Vessels	Number of Landings	Number of Crabs[ab]	Harvest[a,b]	Deadloss[a]
			Bristol Bay Red King Crab			
1998	525,115		Confidential			
1999	580,641		Confidential			
2000	610,265		Confidential			
2001	617,623		Confidential			
2002	714,239		Confidential			
2003	1,167,040	13	20	174,907	1,166,662	2,197
2004	1,135,326	12	21	166,829	1,133,013	2,549
			Pribilof Red King Crab			
1998	35,958 [d]		Confidential			
1999			Fishery Closed			
2000			Fishery Closed			
2001			Fishery Closed			
2002			Fishery Closed			
2003			Fishery Closed			
2004			Fishery Closed			
			Pribilof Blue King Crab			
1998	35,958 [d]		Confidential			
1999			Fishery Closed			
2000			Fishery Closed			
2001			Fishery Closed			
2002			Fishery Closed			
2003			Fishery Closed			
2004			Fishery Closed			
			St. Matthew Blue King Crab			
1998	99,512		Confidential			
1999			Fishery Closed			
2000			Fishery Closed			
2001			Fishery Closed			
2002			Fishery Closed			
2003			Fishery Closed			
2004			Fishery Closed			
			Bering Sea Snow Crab			
1998	8,886,634	20	86	6,975,242	8,846,977	134,898
1999	9,674,326	23	104	7,747,876	9,670,084	92,871
2000	2,518,760		Confidential			
2001	1,878,070		Confidential			
2002	2,458,565	11	33	1,873,443	2,399,289	73,130
2003	2,120,637	10	29	1,747,935	2,118,899	18,378
2004	1,782,081	10	25	1,338,077	1,772,222	24,199
			Bering Sea Tanner Crab			
1998			Fishery Closed			
1999			Fishery Closed			
2000			Fishery Closed			
2001			Fishery Closed			
2002			Fishery Closed			
2003			Fishery Closed			
2004			Fishery Closed			

[a] In pounds.

[b] Deadloss included.

[c] Number of legal crabs per pot pull.

[d] Fishery was executed with an overall quota for both Pribilof red and blue king crab, harvest was tracked by species.

Table 2-41.-The 1998 - 2004 crab Community Development Quota (CDQ) Program economic overview.

Fishery	Harvest[ab]	Exvessel Value[c]	Fishery Value[d]	Average Weight[a]	Pots Registered	Pots Lifted
Bristol Bay Red King Crab						
1998			Confidential			
1999			Confidential			
2000			Confidential			
2001			Confidential			
2002			Confidential			
2003	1,164,465	$ 4.67	$ 5,438,052	6.7	2,470	5,704
2004	1,130,464	$ 3.97	$ 4,487,942	6.8	2,258	5,359
Pribilof Red King Crab						
1998			Confidential			
1999			Fishery Closed			
2000			Fishery Closed			
2001			Fishery Closed			
2002			Fishery Closed			
2003			Fishery Closed			
2004			Fishery Closed			
Pribilof Blue King Crab						
1998			Confidential			
1999			Fishery Closed			
2000			Fishery Closed			
2001			Fishery Closed			
2002			Fishery Closed			
2003			Fishery Closed			
2004			Fishery Closed			
St. Matthew Blue King Crab						
1998			Confidential			
1999			Fishery Closed			
2000			Fishery Closed			
2001			Fishery Closed			
2002			Fishery Closed			
2003			Fishery Closed			
2004			Fishery Closed			
Bering Sea Snow Crab						
1998	8,712,079	$ 0.54	$ 4,704,523	1.3	4,016	39,575
1999	9,577,213	$ 0.85	$ 8,140,631	1.2	5,250	46,490
2000			Confidential			
2001			Confidential			
2002	2,326,159	$ 1.33	$ 3,093,791	1.3	2,100	18,786
2003	2,100,521	$ 1.80	$ 3,780,938	1.2	1,670	14,583
2004	1,748,023	$ 1.99	$ 3,478,566	1.3	1428	13,622
Bering Sea Tanner Crab						
1998			Fishery Closed			
1999			Fishery Closed			
2000			Fishery Closed			
2001			Fishery Closed			
2002			Fishery Closed			
2003			Fishery Closed			
2004			Fishery Closed			

[a]In pounds.

[b]Deadloss not included.

[c]Average price per pound.

[d]CDQ group portion estimated at 20 to 30% of fishery value.

Table 2-42.-Pot Limits for Bering Sea king and Tanner crab Fisheries, 2004.

Fishery	GHL Range[a]	Number of Vessels	Pot Limits = 125' [b]	Pot Limits > 125' [b]
Bering Sea District snow crab [c]	15 = or < 20	-	70	90
	20 = or < 25	-	100	120
	= 25	-	200	250
Eastern Aleutian District Tanner crab [d]	-	-	Total Allowable Pots 300	
St. Matthew Island Section king crab [e]	-	-	60	75
Pribilof District king crab [e]	-	-	40	50
Bristol Bay red king crab [f]	< 4.0	Fishery Closed		
	4.0 = to < 6.0	< 200	80	100
		200 to 250	60	75
		> 250	60	75
	6.0 = to < 9.0	< 200	120	150
		200 to 250	100	125
		> 250	100	125
	9.0 = to 12	< 200	200	250
		200 to 250	160	200
		> 250	160	200
	> 12	Any	200	250
Petrel Bank red king crab [c]	-	-	Total Allowable Pots 1,250	

[a] In millions of pounds. Does not include Community Development Quota pounds.

[b] Vessel Length Overall in feet.

[c] Multi-tier pot limits effective 2002.

[d] Total allowable pots divided into number of preseason registered vessels.

[e] Pot limits independent of number of registered vessels and GHL.

[f] Multi-tiered pot limits effective 1997.

Table 2-43.-Number of Bering Sea buoy tags printed and issued by fishery, 2004.

Fishery	Number of Tags Ordered[a]	Tag Sets Issued = 125'[b]	Tag Sets Issued > 125'[b]	Total Sets	Tags Issued = 125'[b]	Tags Issued > 125'[b]	Tags Replaced	Total Tags
South Peninsula grooved Tanner crab	Surplus Tags			NO FISHING EFFORT				
Pribilof red and blue king crab	Tags in Storage			FISHERY CLOSED				
Pribilof red and blue king crab CDQ[c]	-			FISHERY CLOSED				
Pribilof golden king crab	Surplus Tags	4	1	5	160	50	6	216
St. Matthew blue king crab	Tags in Storage			FISHERY CLOSED				
St. Matthew blue king crab CDQ[c]	-			FISHERY CLOSED				
Bristol Bay red king crab	65,000	177	74	251	31,866	17,640	17	49,523
Bristol Bay red king crab CDQ[c]	Surplus Tags	6	6	12	1,055	1,203	0	2,258
Bering Sea snow crab	Surplus Tags	126	65	191	8,820	5,850	4	14,674
Bering Sea snow crab CDQ[c]	Surplus Tags	7	3	10	883	545	0	1,428
Eastern Aleutian District Tanner	Surplus Tags	15	1	16	180	12	5	197
Total	65,000	335	150	485	42,964	25,300	32	68,296

[a] Tags ordered in sets of 200, then separated for each fishery pot limit.
[b] Vessel Length Overall in feet.
[c] Community Development Quota.

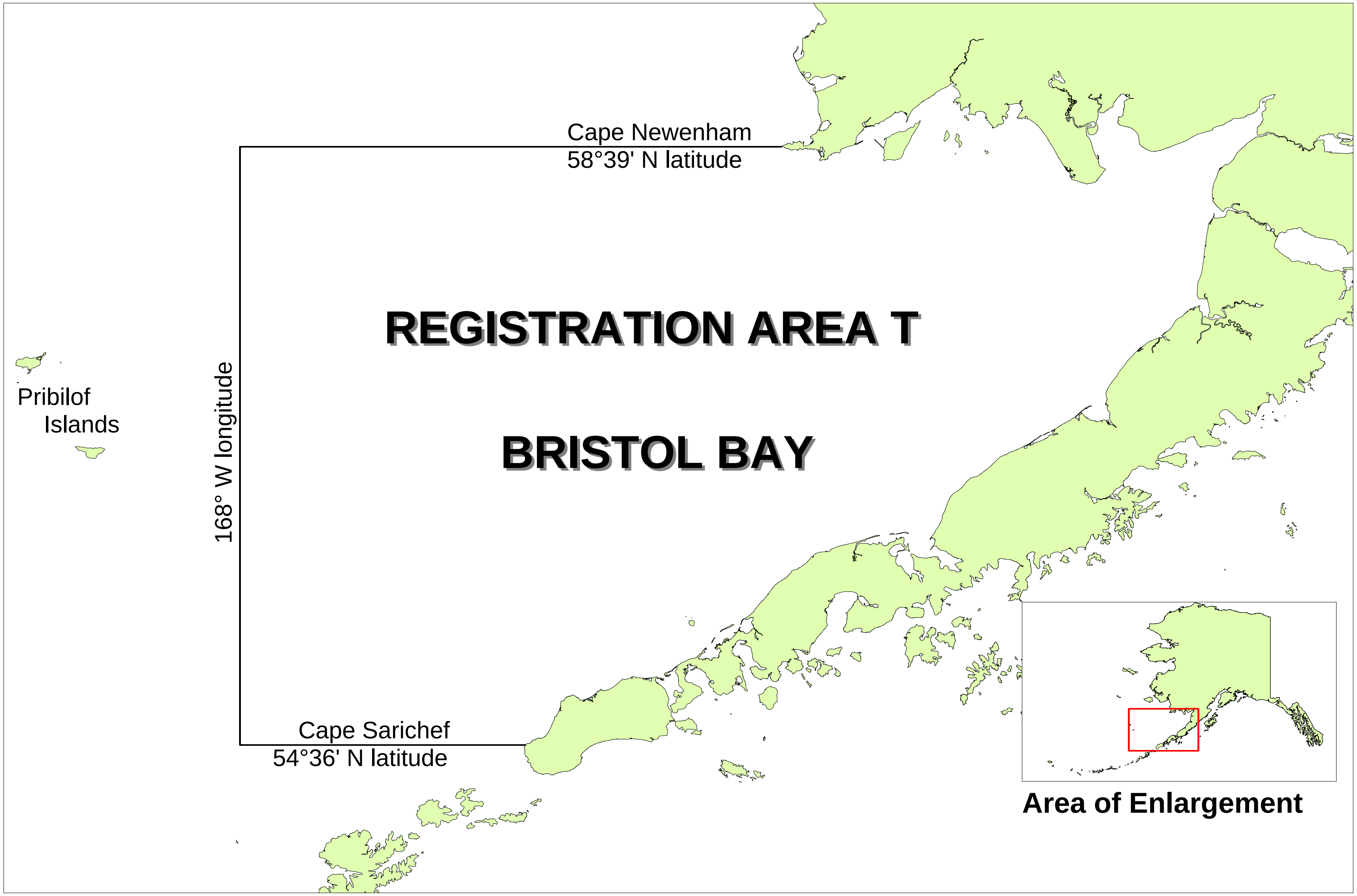

Figure 2-1.-King crab Registration Area T (Bristol Bay).

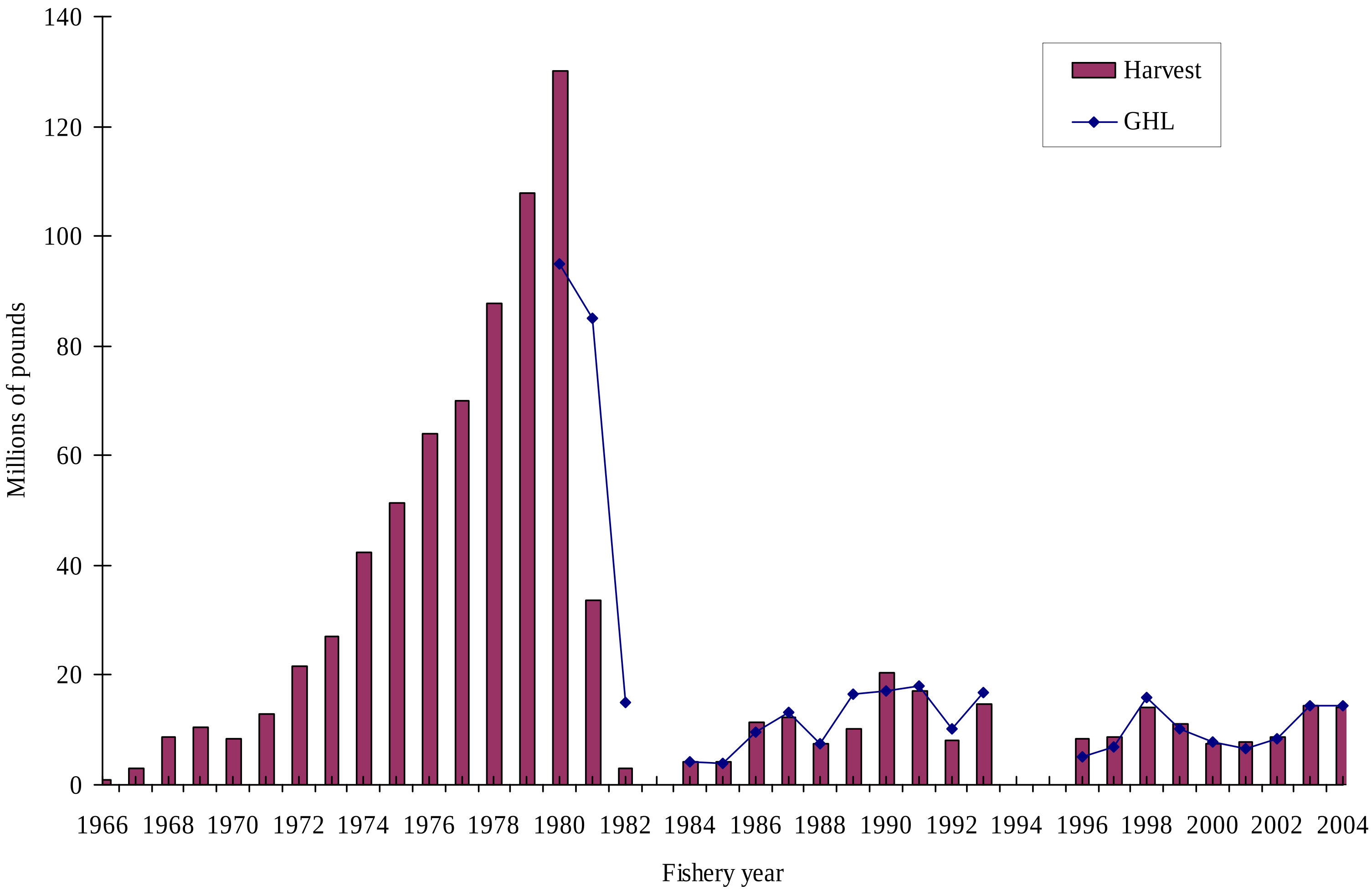

Figure 2-2.-Bristol Bay commercial red king crab fishery harvest and guideline harvest levels, 1966-2004.

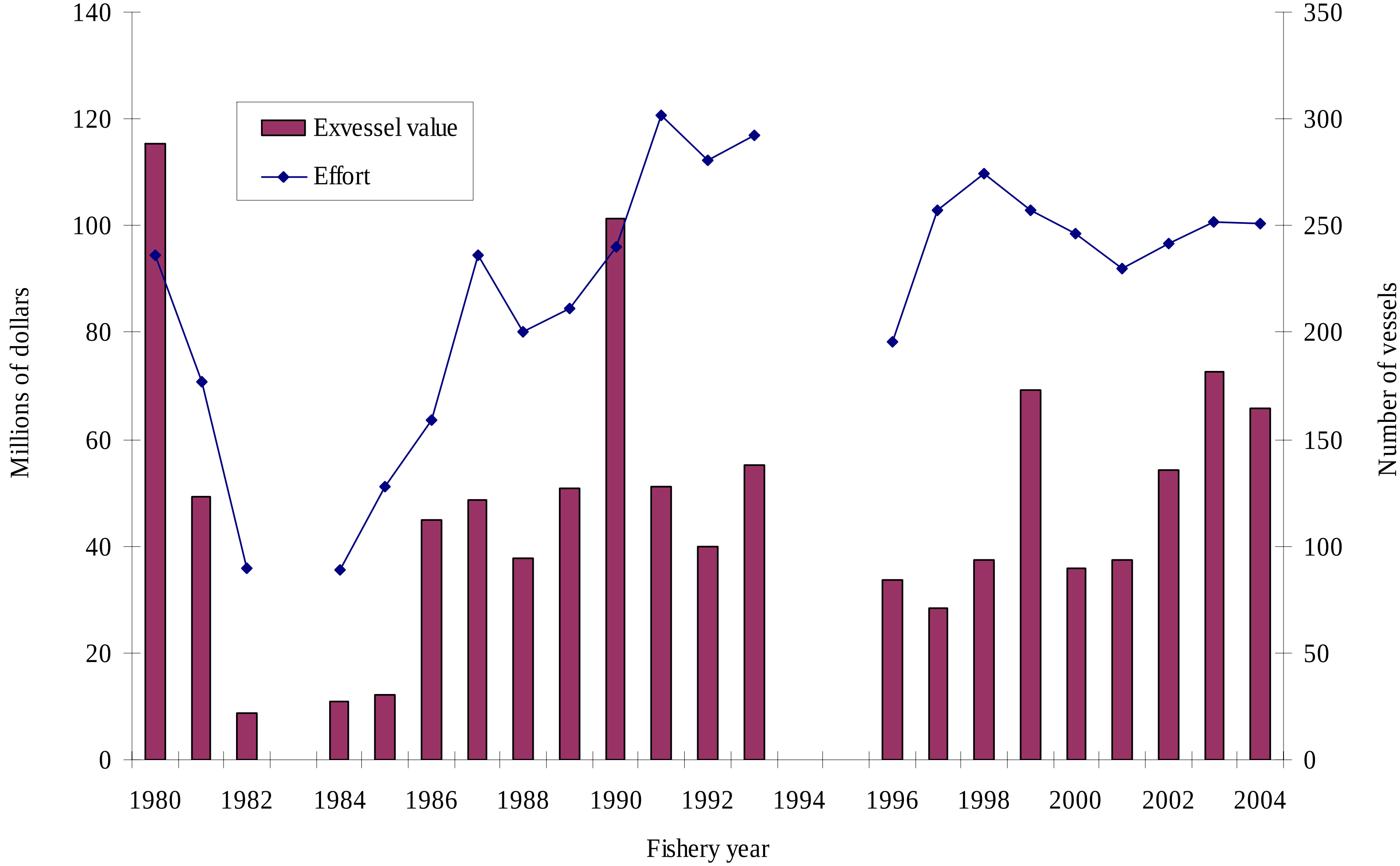

Figure 2-3.-Bristol Bay commercial red king crab fishery effort and ex-vessel value, 1980-2004.

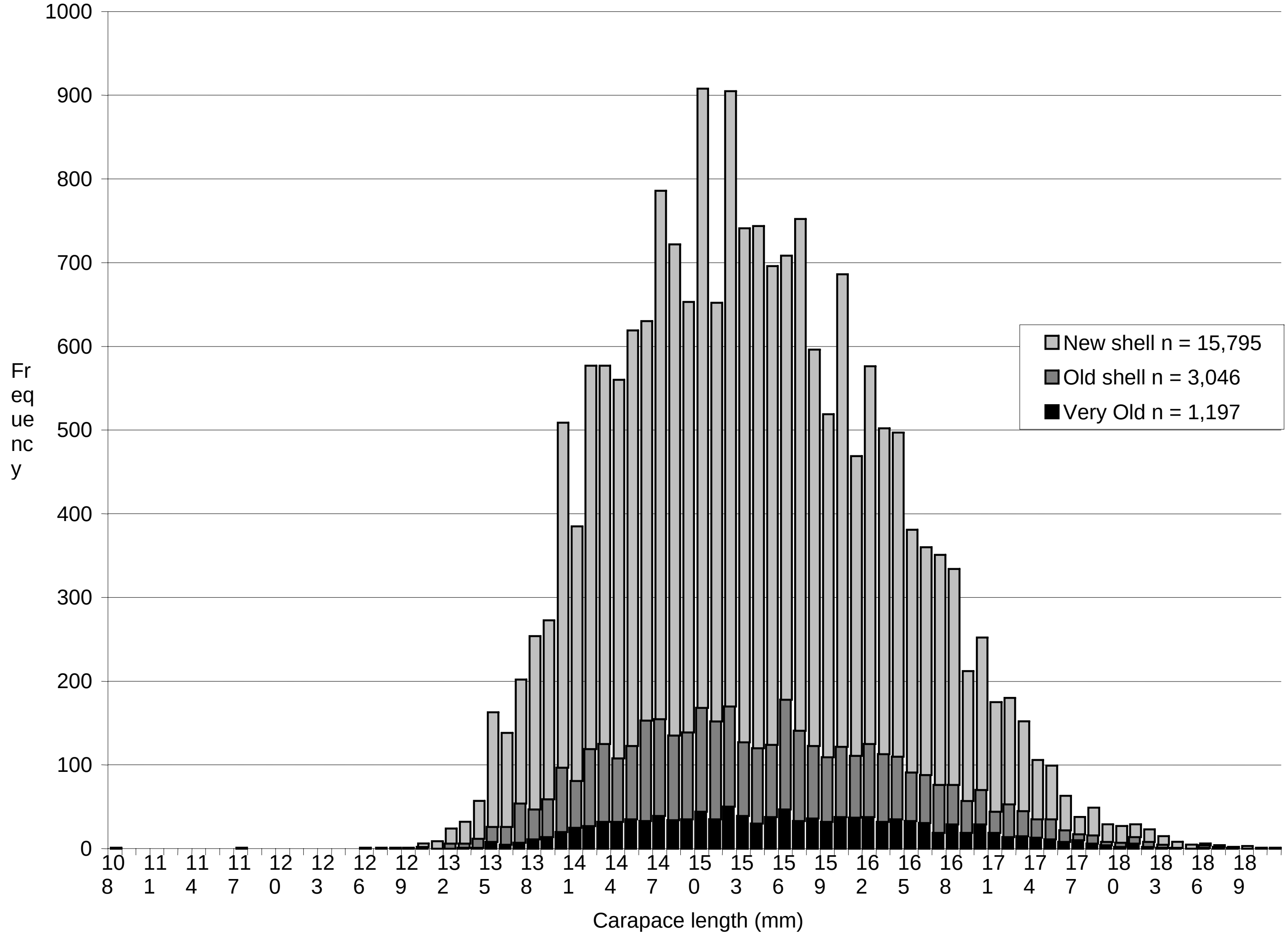

Figure 2-4.-Carapace length and shell condition of Bristol Bay red king crabs harvested during the 2004 general fishery.

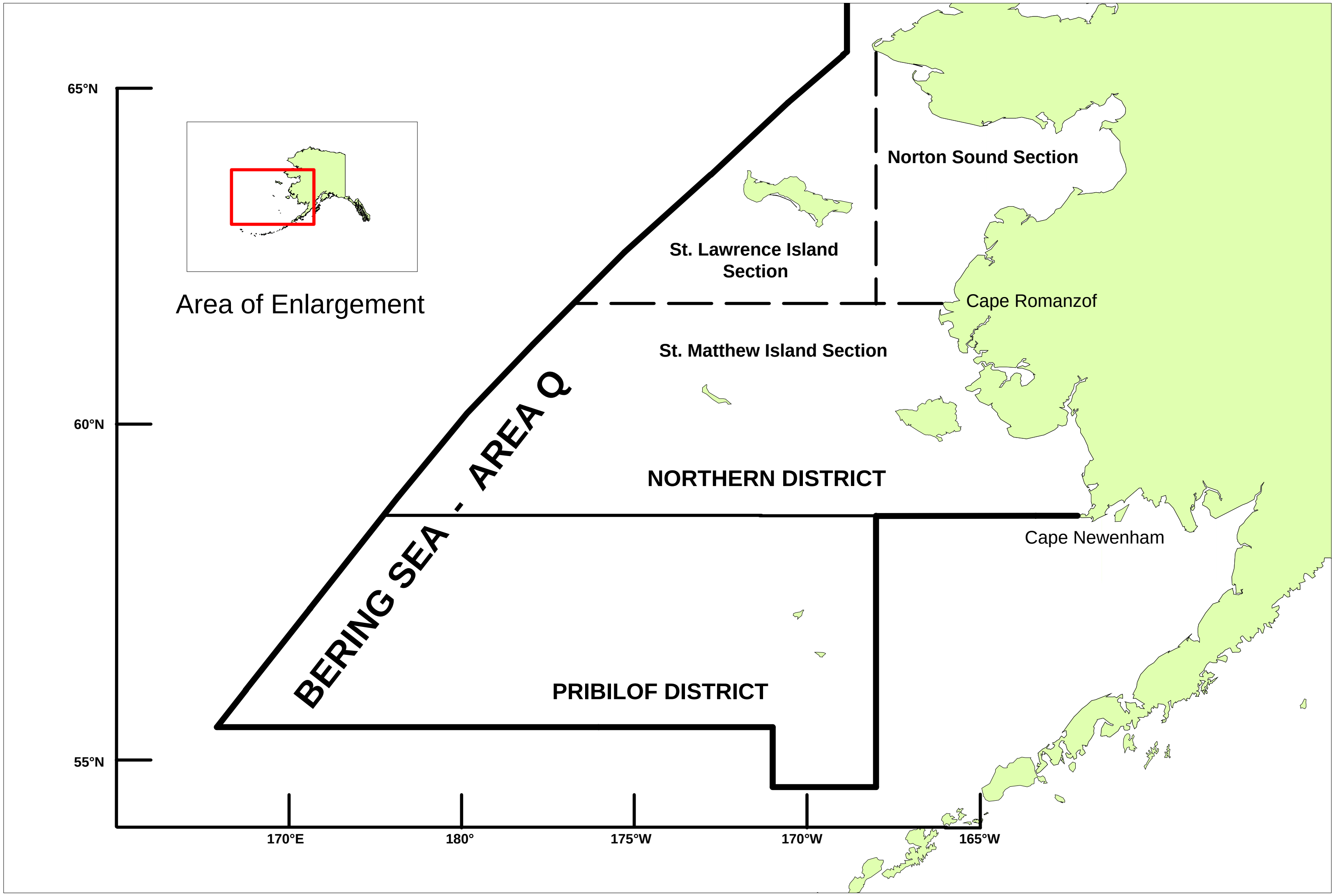

Figure 2-5.-King crab Registration Area Q (Bering Sea).

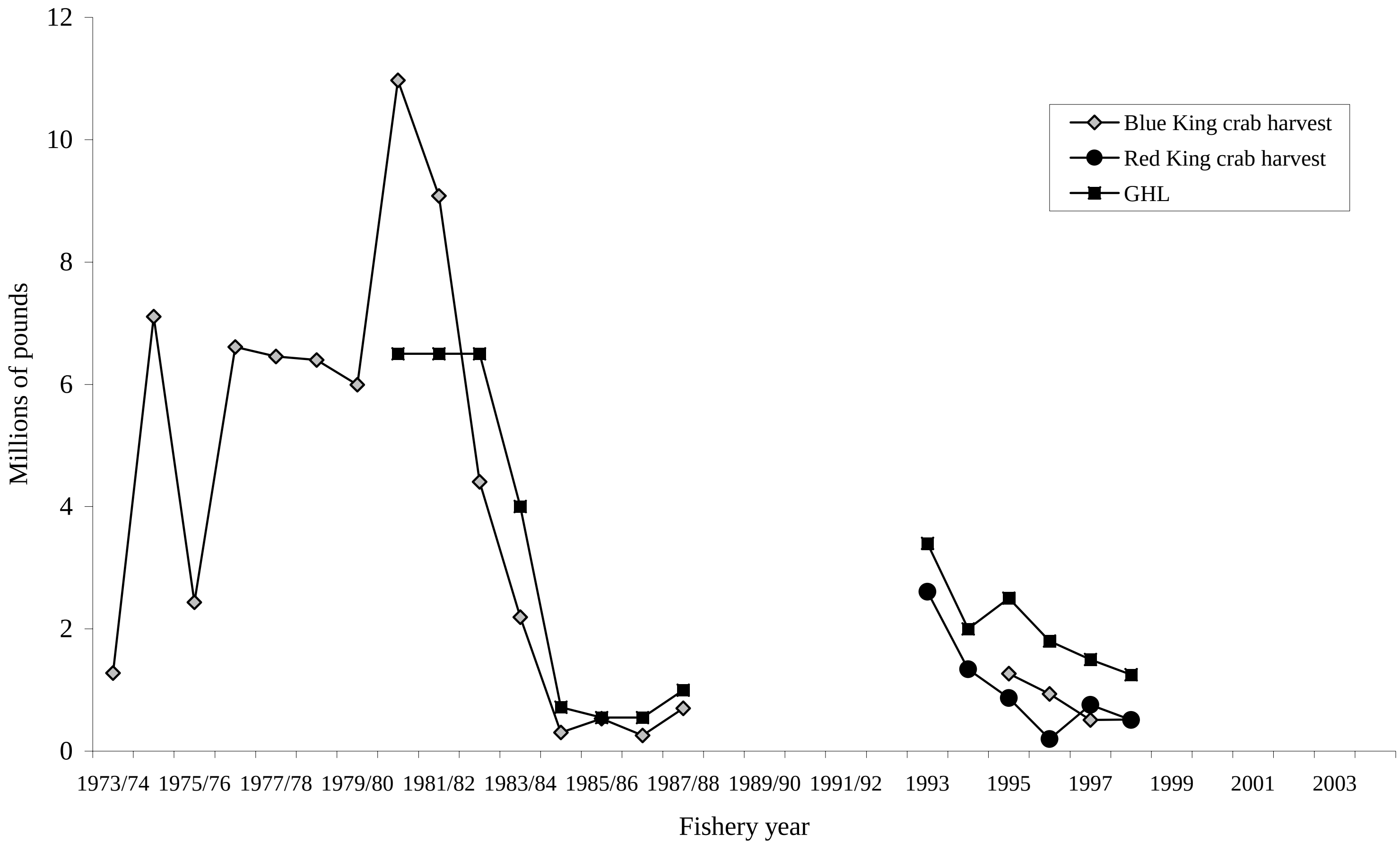

Figure 2-6.-Pribilof District red and blue king crab harvest and guideline harvest level (GHL) 1973/74 **-** 2004. GHL for red and blue king crab is combined from 1995 to 1998. Fishery closed beginning 1999.

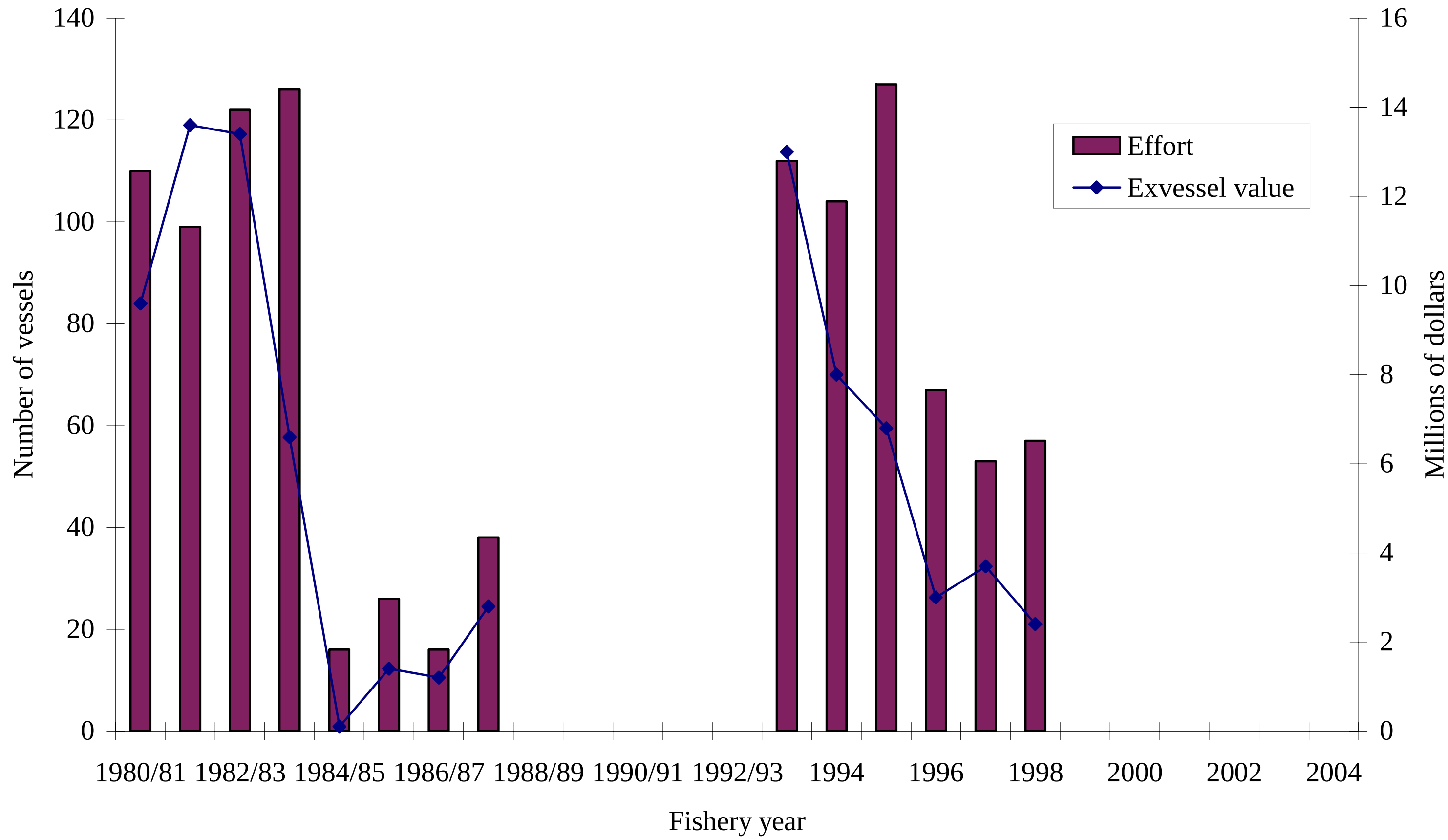

Figure 2-7.-Pribilof District commercial red and blue king crab fishery effort and exvessel value, 1980/81 **-** 2004. Fishery closed beginning 1999.

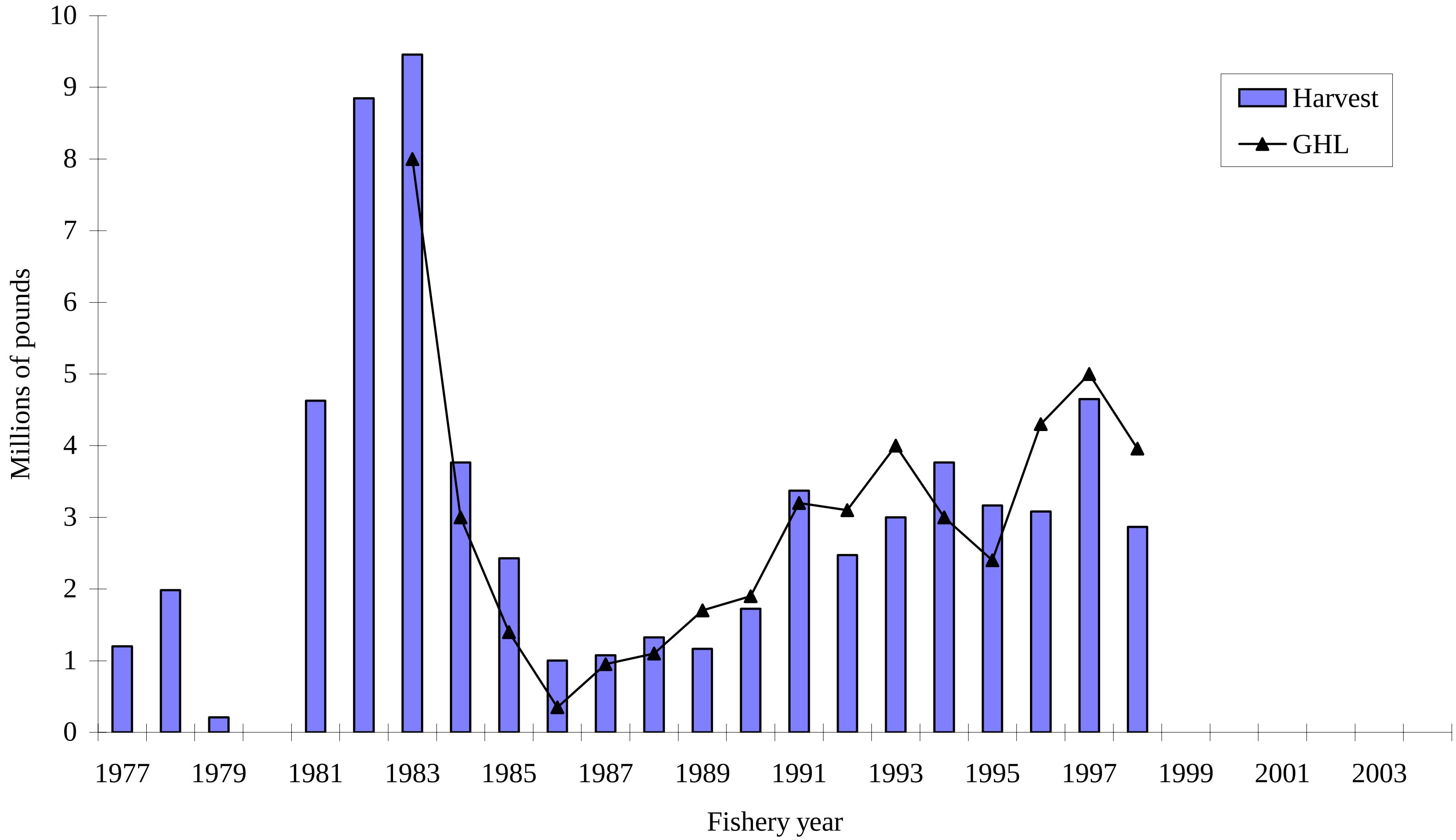

Figure 2-8.-Saint Matthew Island Section commercial blue king crab fishery harvest and guideline harvest level, 1977 **-** 2004. Fishery closed beginning 1999.

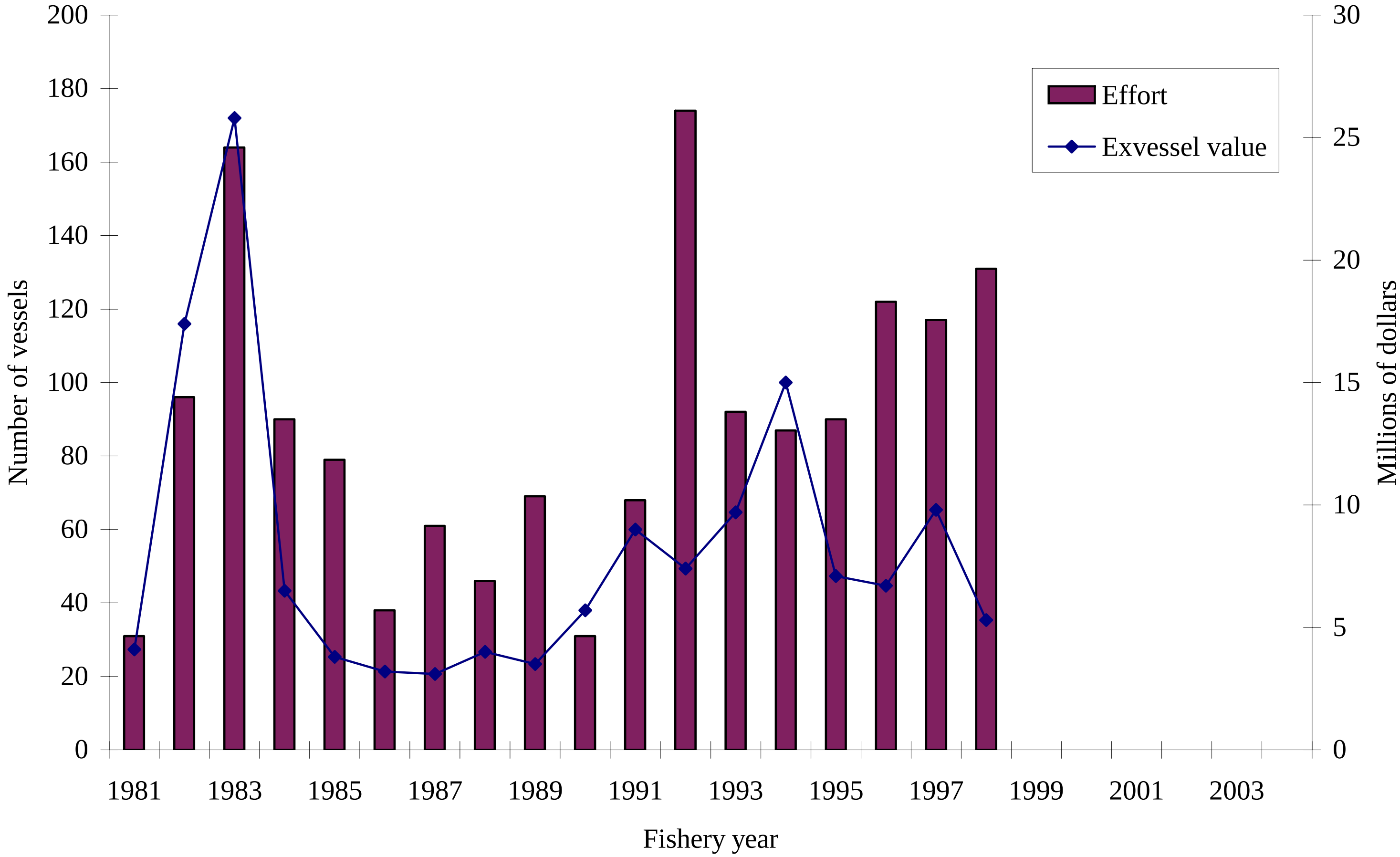

Figure 2-9.-Saint Matthew Island Section commercial blue king crab fishery effort and exvessel value, 1981-2004. Fishery closed beginning 1999.

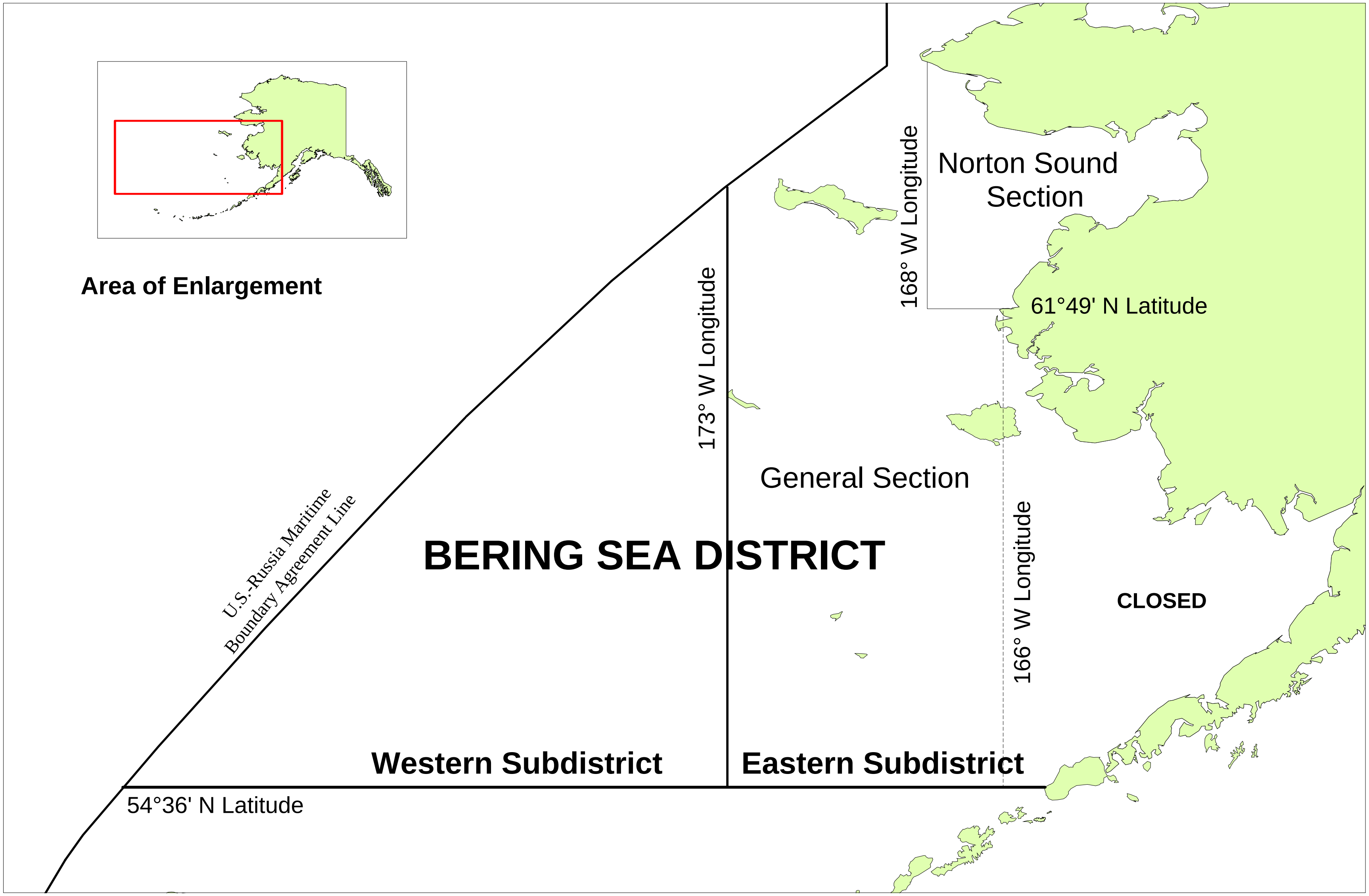

Figure 2-10.-Bering Sea District of Tanner crab Registration Area J including subdistricts and sections.

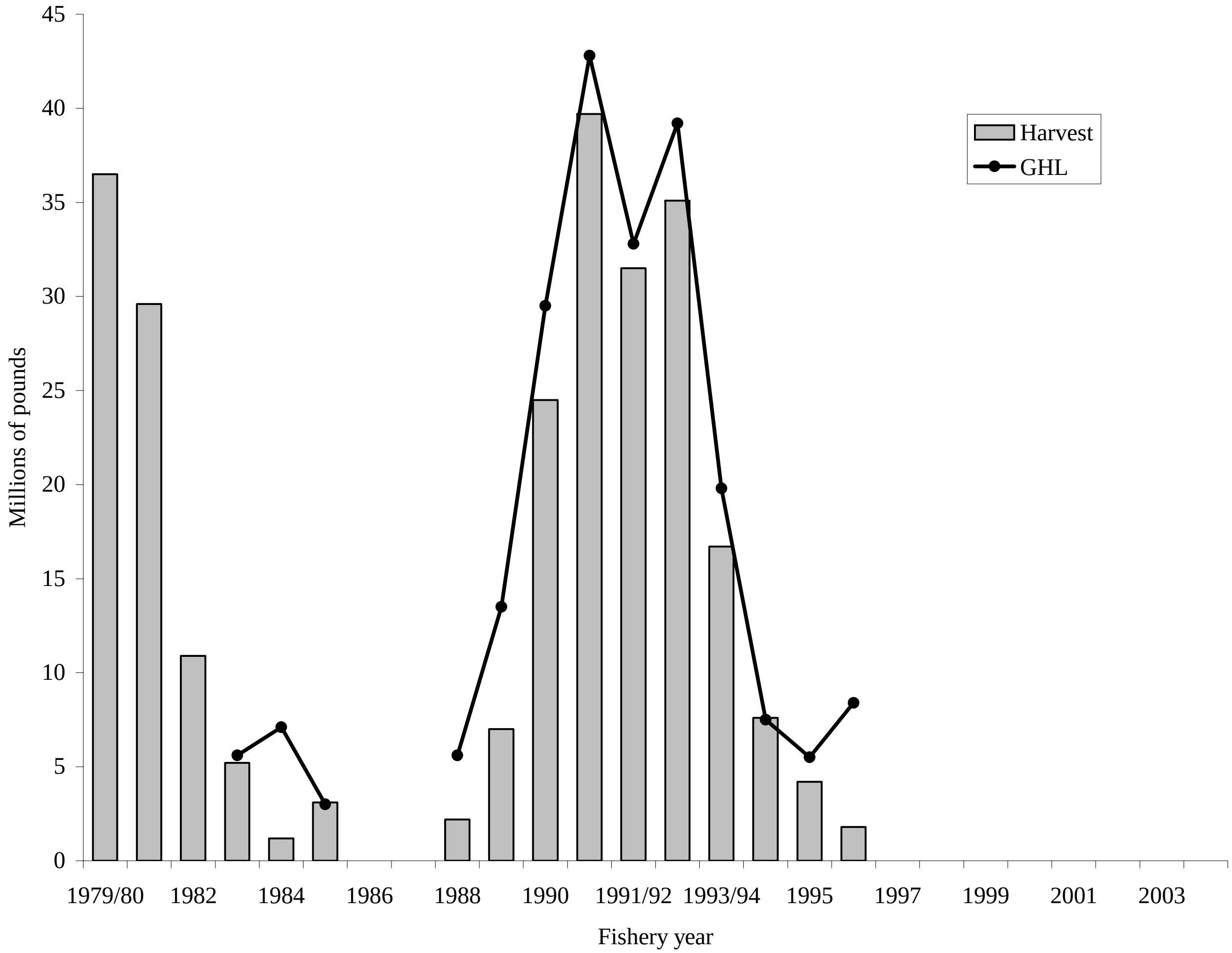

Figure 2-11.-Bering Sea District commercial Tanner crab harvest and guideline harvest levels, 1979/80-2004. Fishery closed beginning 1997.

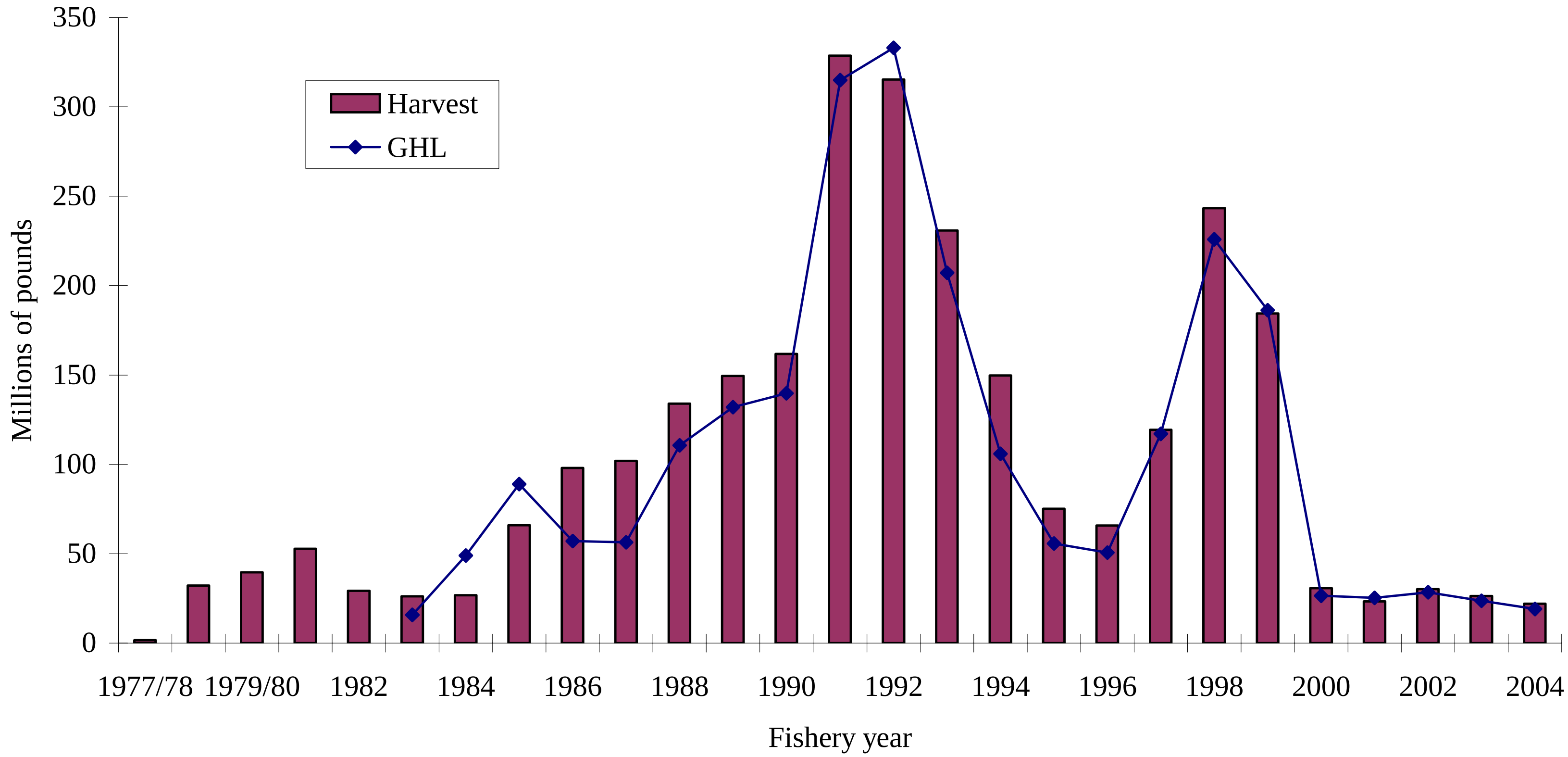

Figure 2-12.-Bering Sea District commercial snow crab fishery harvest and guideline harvest level, 1977/78-2004.

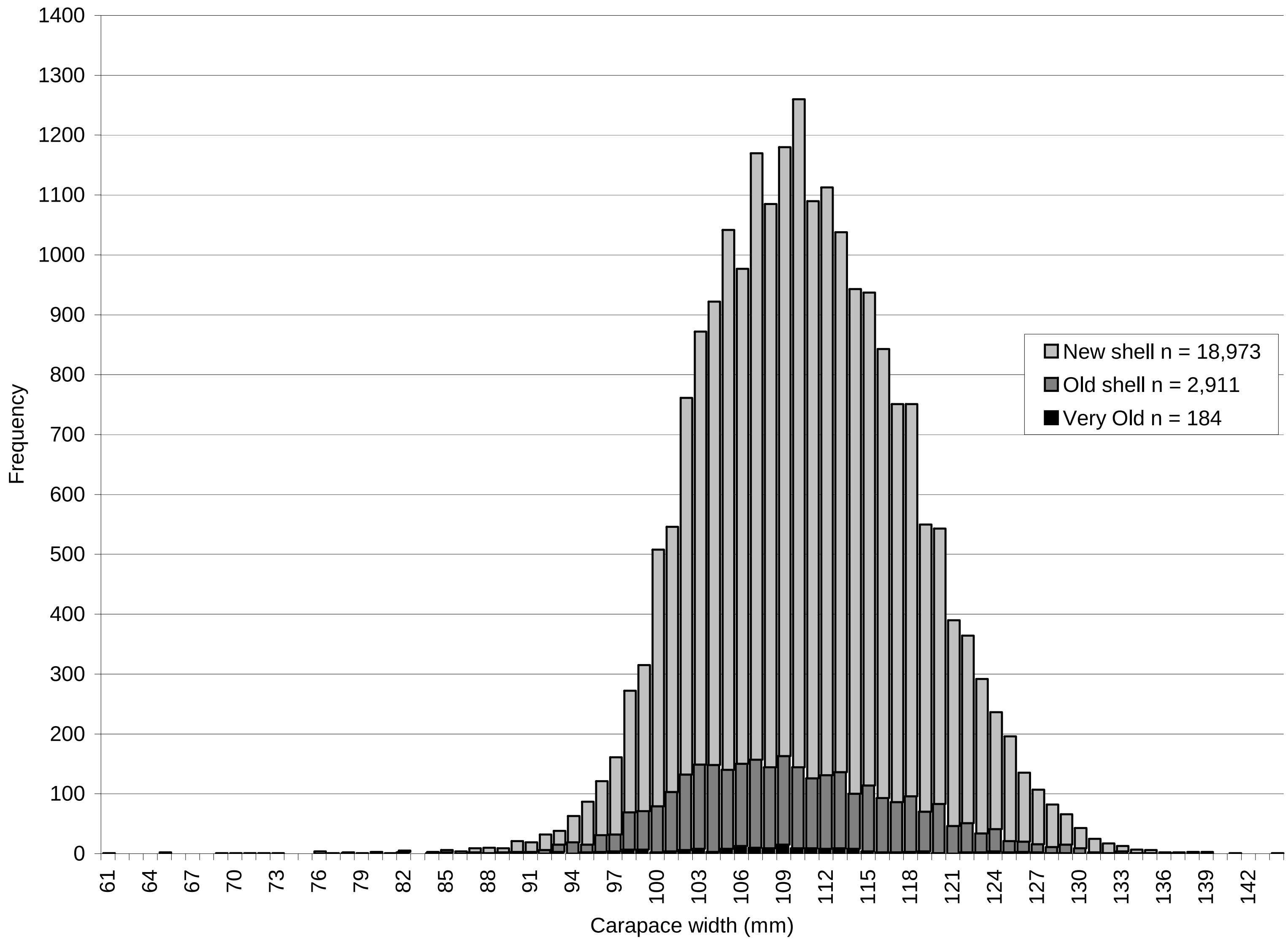

Figure 2-13.-Carapace width and shell condition from the 2004 Bering Sea snow crab general fishery.

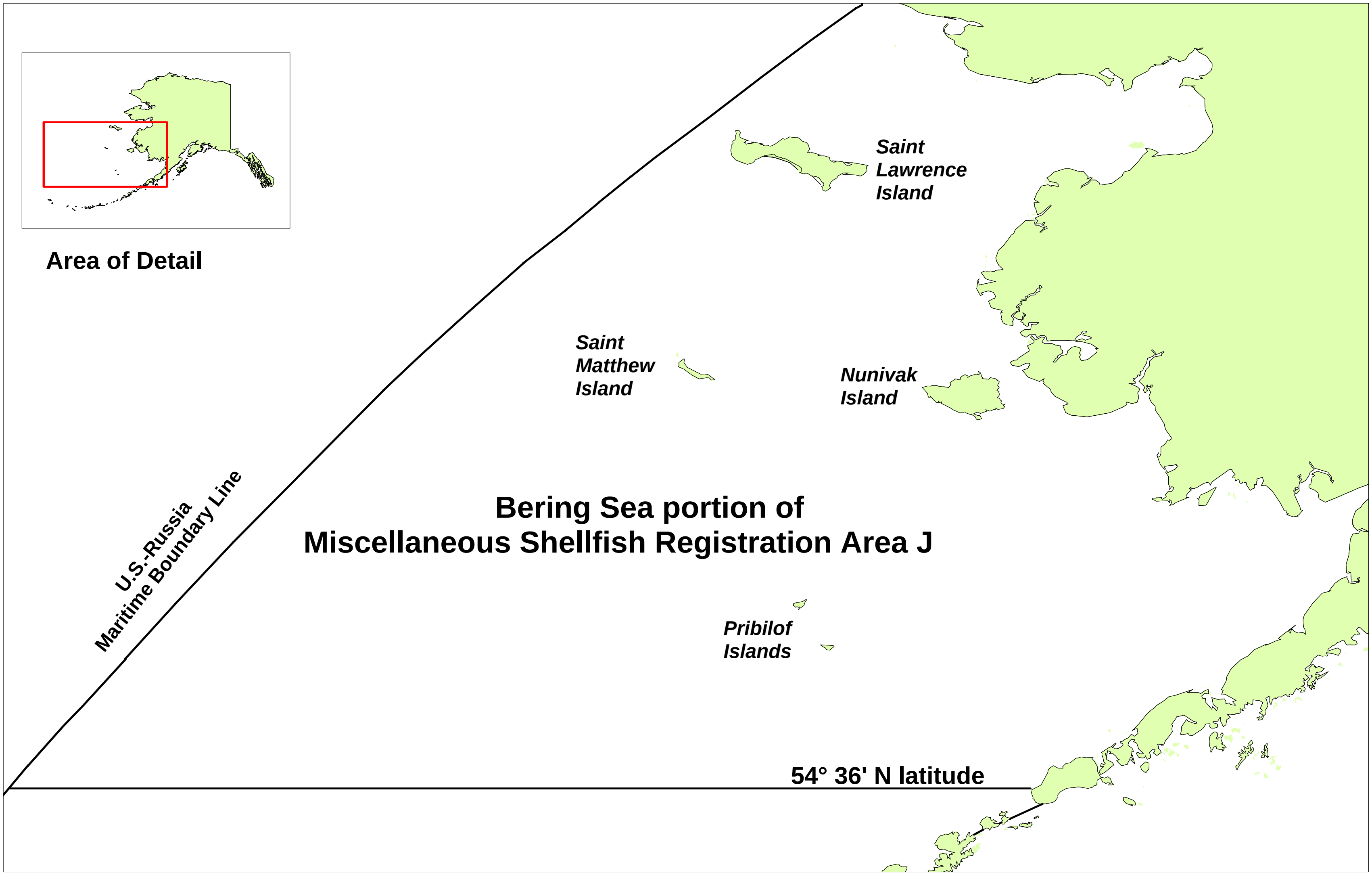

Figure 2-14.-Bering Sea portion of miscellaneous shellfish Registration Area J.

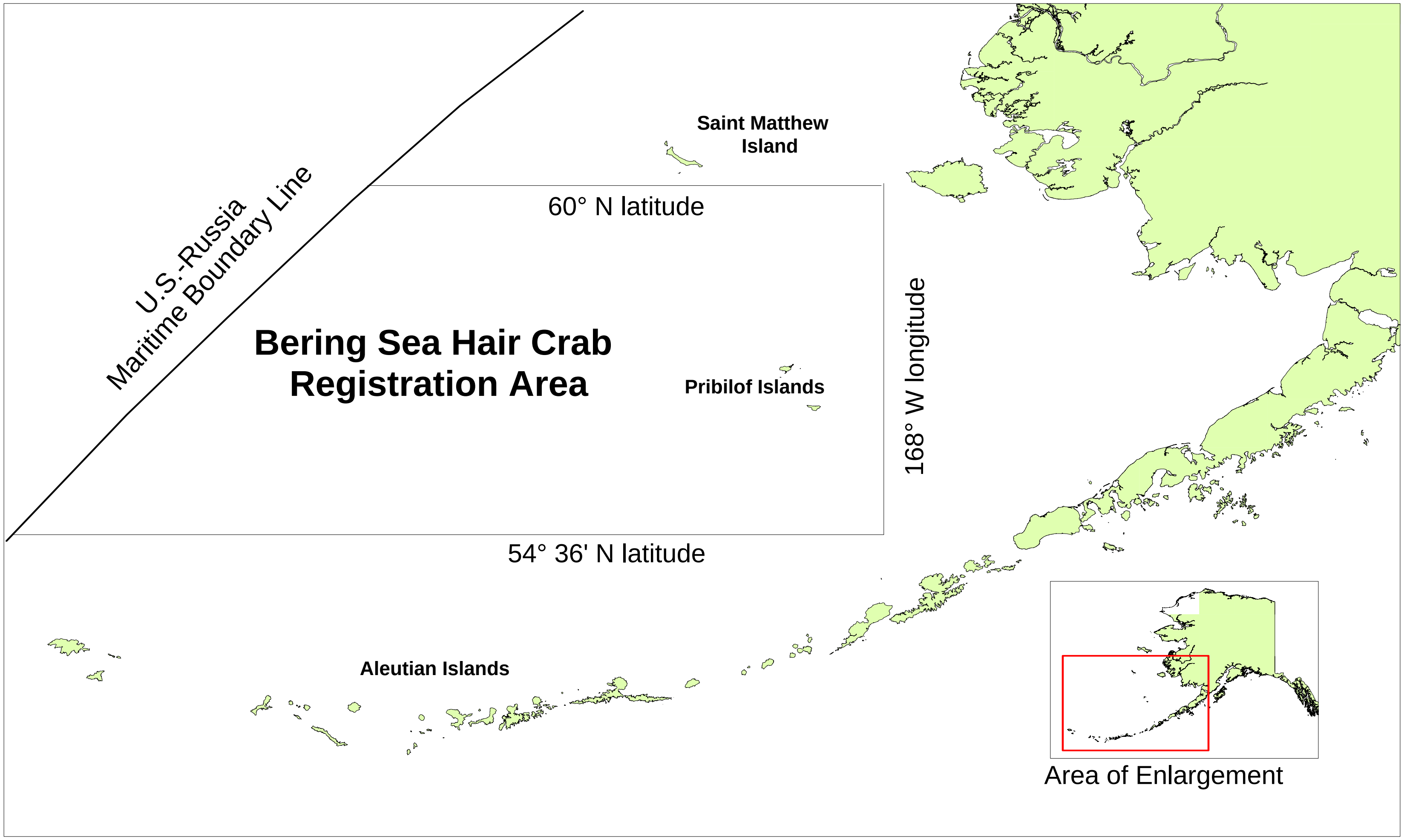

Figure 2-15.-Bering Sea hair crab fishing area of miscellaneous shellfish Registration Area J.

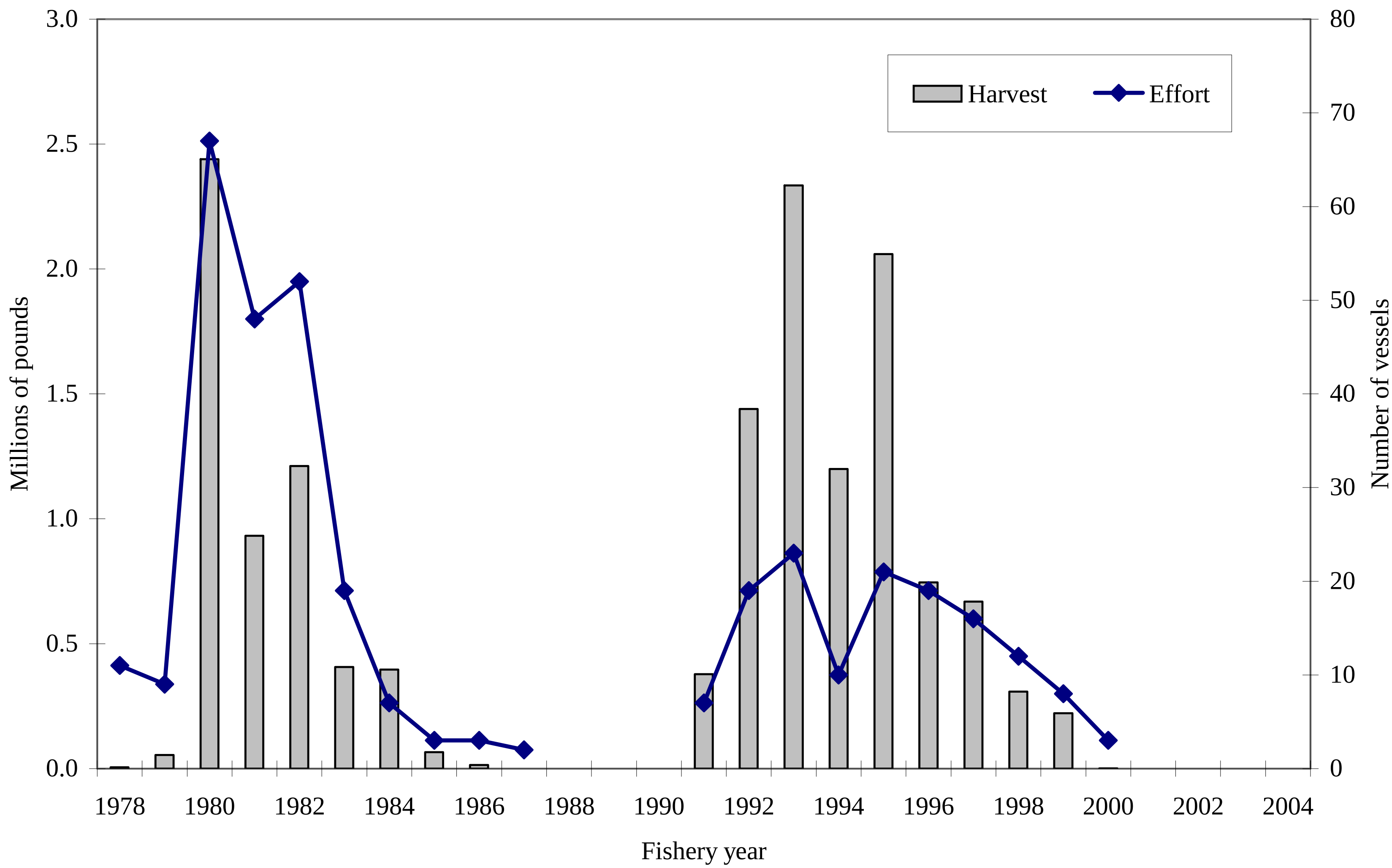

Figure 2-16.-Bering Sea commercial hair crab fishery harvest and effort, 1978-2004.

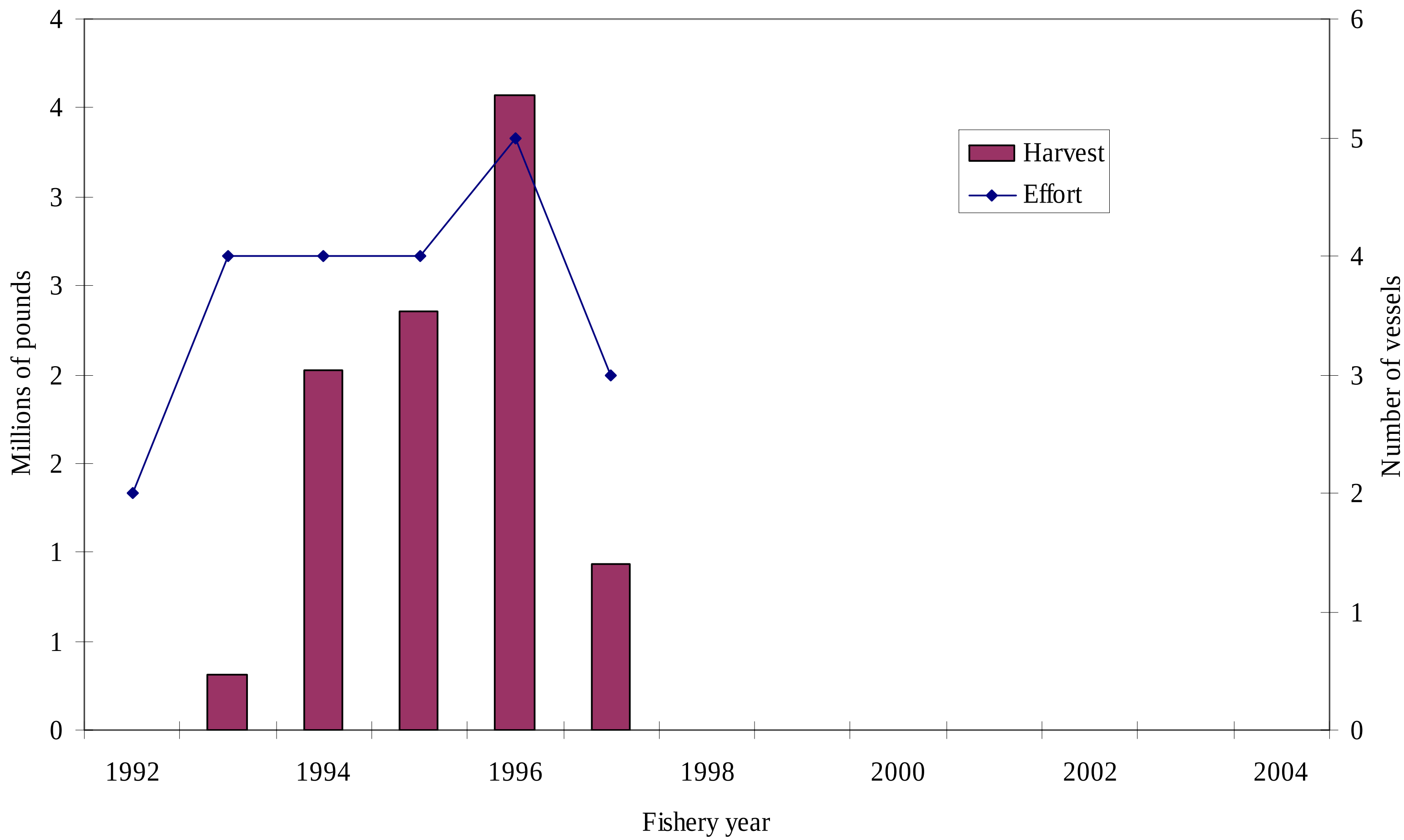

Figure 2-17.-Bering Sea commercial snail fishery harvest and effort, 1992 - 2004.

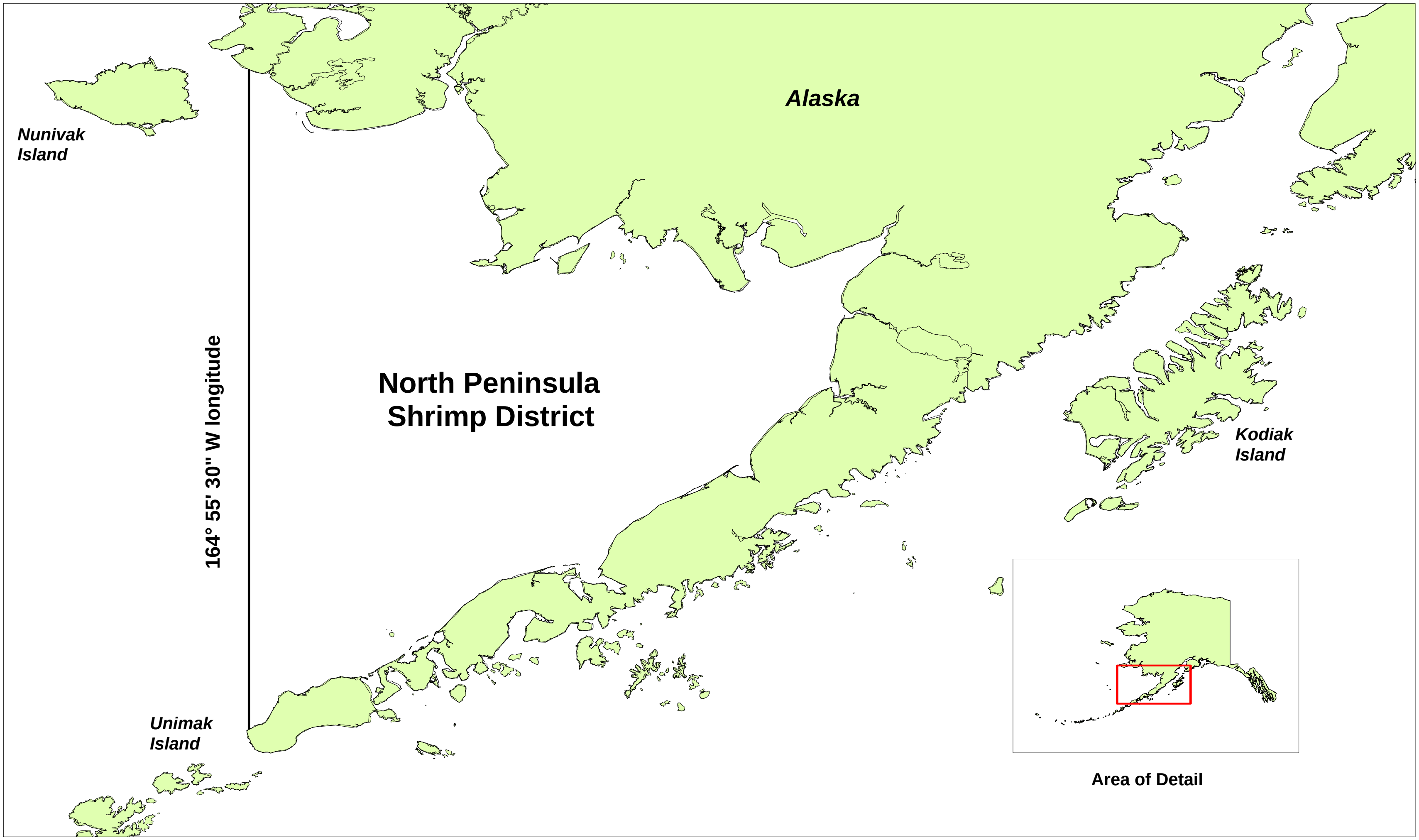

Figure 2-18.-North Peninsula District of shrimp Registration Area J.

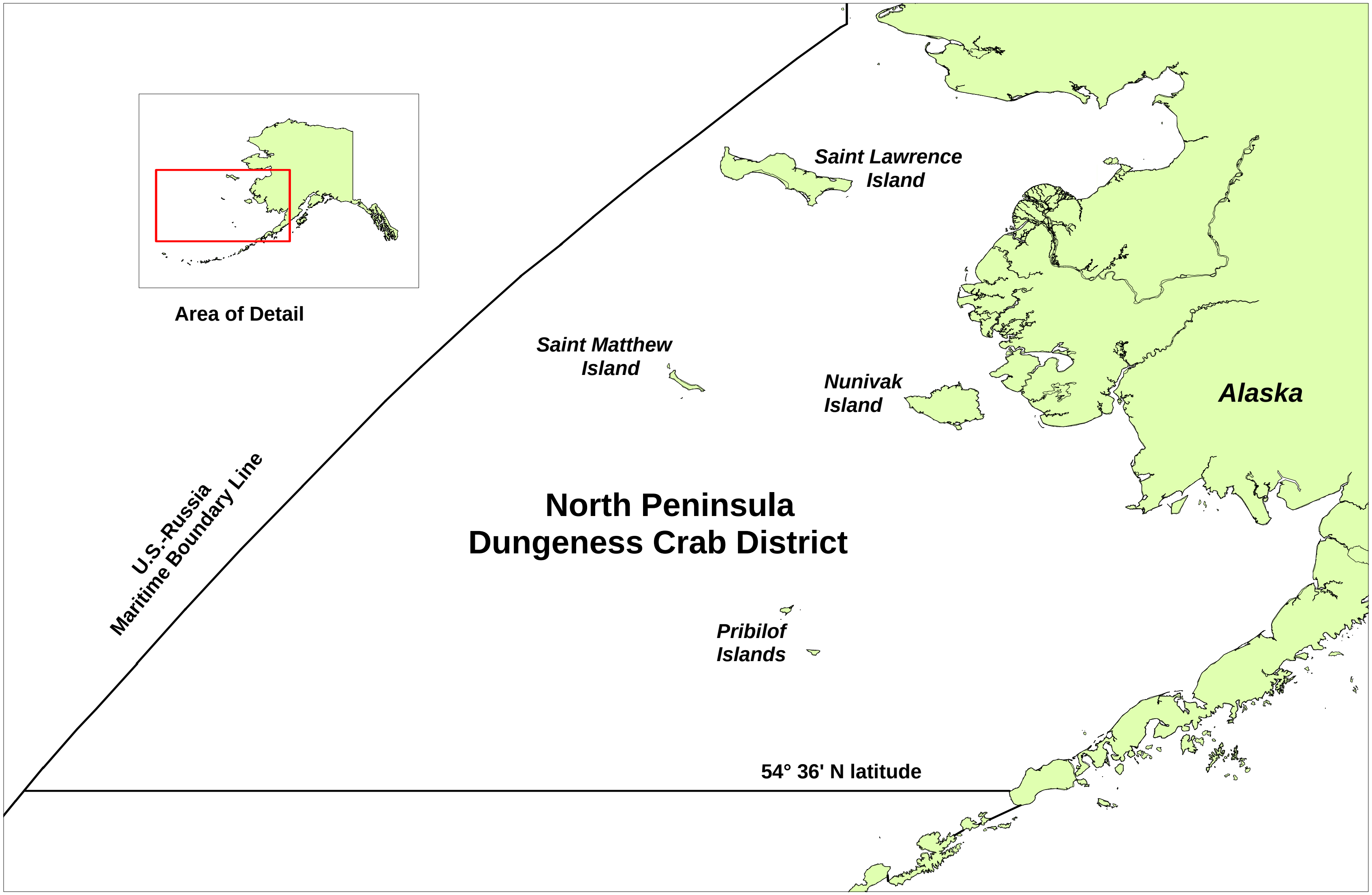

Figure 2-19.-North Peninsula District of Dungeness crab Registration Area J.

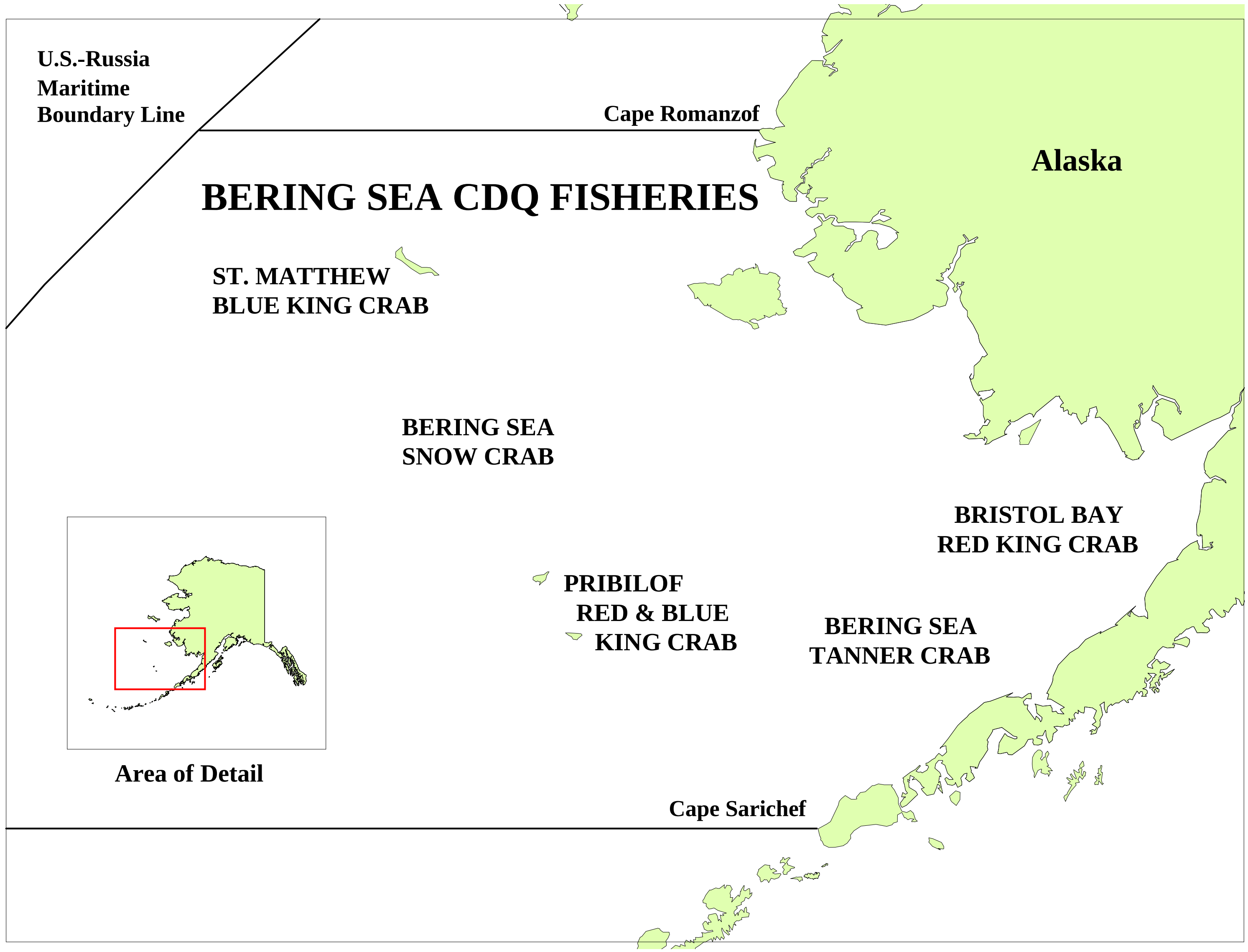

Figure 2-20.-Bering Sea Community Development Quota Program crab fisheries managed by the Westward Region.

ANNUAL REPORT OF THE ONBOARD OBSERVER PROGRAM FOR THE WESTWARD REGION CRAB AND STATEWIDE SCALLOP FISHERIES

Mary Schwenzfeier, Jeffrey Barnhart, Shari Coleman, Melissa Salmon, Krista Milani

Dutch Harbor Area Office, P.O. Box 920587, Dutch Harbor, Alaska 99692

INTRODUCTION

Onboard observer data collection and fishery monitoring is an integral component of fisheries management. The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) of 1996 states in Findings (8) "The collection of reliable data is essential to the effective conservation, management, and scientific understanding of the fishery resources of the United States" (U.S. Department of Commerce 1996).

The State of Alaska Shellfish Onboard Observer Program has evolved to help meet the MSFCMA National Standards. The Alaska Department of Fish and Game (ADF&G) commercial shellfish fishing regulation 5 AAC 39.645. SHELLFISH ONBOARD OBSERVER PROGRAM, states that onboard observers afford the only practical mechanism of gathering essential biological and management data in particular fisheries, and provide the only effective means to enforce regulations that protect the shellfish resource.

This report summarizes the activities of the ADF&G crab and scallop observer programs for calendar year 2004. Observer deployment activities in all observer-monitored crab fisheries are outlined for the 2004 fisheries, with the addition of the 2003/2004 Aleutian Islands golden king crab fishery. Statewide scallop observer deployment activities are summarized for the 2004/2005 regulatory season.

HISTORY OF SHELLFISH OBSERVER PROGRAMS

CRAB OBSERVER PROGRAM

In April 1988, the Alaska Board of Fisheries (BOF) adopted regulations requiring observers on all vessels that process king crabs *Paralithodes* and *Lithodes*, and Tanner crabs *Chionoecetes bairdi* within waters under the jurisdiction of the state. The observer requirement was prompted by historic catch information collected by ADF&G, which suggested illegal processing of undersized and female crabs by catcher-processors (C/Ps) in the Bering Sea and Aleutian Islands (BSAI) fisheries. These regulations resulted in the creation of the Shellfish Onboard Observer Program. At inception, the primary program goals were to monitor compliance of sex and size regulations of retained crabs, and collect data for inseason management of BSAI fisheries. The cost of providing onboard observers is borne by the at-sea processors. The first observer deployments occurred in September 1988 during the Bristol Bay red king crab *P. camtschaticus* fishery.

In the spring of 1990, the BOF broadened observer coverage to include vessels processing snow crabs *C. opilio.* This change was considered necessary based on reports of undersized Tanner crabs being processed and labeled as snow crabs. The BOF also defined observer qualification standards and observer duties and responsibilities. In the fall of 1991, the BOF adopted observer certification and decertification standards.

In 1993, the department required vessels to carry shellfish observers as a condition of the permit for fishing hair crabs *Erimacrus isenbeckii* in the Bering Sea. BOF regulations implemented in 1994 allow the department to require, as a condition of the commissioner's permit, 100% observer coverage on vessels targeting grooved Tanner crabs *C. tanneri*, triangle Tanner crabs *C. angulatus*, scarlet king crabs *Lithodes couesi*, and cherry crabs *Paralomis multispinus*. Management and research of these fisheries rely almost completely on observer-collected data to determine the impacts of fishing activities. Beginning in

1995, shellfish observers were required on all vessels fishing for king crabs in the Aleutian Islands Registration Area.

An Amendment to the MSFCMA provided for the development and implementation of a Community Development Quota (CDQ) program for specific crab fisheries in the Bering Sea. The CDQ amendment was incorporated into the existing state-managed shellfish fisheries in 1998. Six separate CDQ groups are designated for the Bering Sea: Bristol Bay Economic Development Corporation (BBEDC), Coastal Villages Region Fund (CVRF), Central Bering Sea Fishermen's Association (CBSFA), Yukon Delta Fisheries Development Association (YDFDA), Norton Sound Economic Development Corporation (NSEDC), and Aleutian Pribilof Island Community Development Association (APICDA). Crab fisheries included in the CDQ program are Bristol Bay red king crab, Norton Sound red king crab, St. Matthew blue king crab *P. platypus*, Pribilof red and blue king crab, and Bering Sea Tanner and snow crab. Observer coverage levels have varied since initiation of the CDQ program, but all participating groups must adhere to the observer requirements regardless of vessel type.

In 1998, Congress passed the American Fisheries Act (AFA), which gave eligible walleye pollock *Theragra chalcogramma* fishers exclusive fishing privileges in the Bering Sea walleye pollock fishery. To protect the interests of fishers not directly benefited by the AFA, sideboards were established for AFA boats qualified to participate in specific Bering Sea crab and statewide scallop fisheries. Partial observer coverage levels are required for the AFA catcher-vessel fleet.

The number of C/Ps participating in various BSAI fisheries has decreased since the inception of the observer program, therefore reducing the number of deployed observers. Consequently, observer data no longer provided a representative sample of the fleet's activities in a particular fishery, thus hampering the department's ability to adequately monitor harvests and bycatch information. Therefore in 1999, the BOF granted ADF&G full authority and responsibility for deploying observers on any vessel participating in BSAI crab fisheries. The BOF also established a 15-member Crab Observer Oversight Task Force (COOTF) comprised of crab industry representatives to provide program recommendations to ADF&G. In addition to the pay-as-you-go funding mechanism, where vessels secure and pay for observer coverage, the BOF endorsed funding for additional observer deployments through ADF&G cost-recovery fishing (Boyle and Schwenzfeier 2000). The test-fish funded portion of the program was initiated July 1, 2000.

With a rapid increase in observer participation on catcher-only vessels (C/Vs), observer training and logistic efforts could not meet industry demands. Therefore, in 2002, in an effort to address observer shortages, the BOF relaxed conflict of interest standards by increasing an observer's time on any one vessel in 12 consecutive months from 90 days to 120 days in particular fisheries. Additionally, as an effort to retain observers in spite of shorter fishing seasons, trainee permits may be extended to 365 days for crab observers and 270 days for scallop observers so that a trainee may gain the experience needed to obtain full certification.

SCALLOP OBSERVER PROGRAM

From the inception of the fishery in 1967 through mid May 1993, the scallop fishery was passively managed employing minimal management measures. Closed waters and seasons were established to protect crabs and crab habitat. As catches declined in one bed, vessels moved to better grounds. While this may have been generally acceptable for a sporadic low intensity fishery, increased participation led to boom and bust cycles (Barnhart 2003).

In the early 1990s, the Alaska weathervane scallop fishery expanded rapidly with an influx of scallop boats from the East Coast of the United States. Concerns about bycatch (in particular crab bycatch) and overharvest of the scallop resource prompted the Commissioner of ADF&G, under 5 AAC 39.210, to designate the weathervane scallop fishery a high impact emerging fishery on May 21, 1993. This action required ADF&G to close the fishery and implement an interim management plan prior to reopening. The interim management plan contained provisions for king and Tanner crab bycatch limits for most areas within the Westward Region. Since then, crab bycatch limits have been established for the Kamishak District of the Cook Inlet Registration Area and the Prince William Sound Registration Area. The interim management plan included a provision for 100% onboard observer coverage to monitor crab bycatch and to collect biological and fishery-based data. The Commissioner adopted the regulations and reopened the fishery on June 17, 1993. In March 1994, the BOF adopted the interim regulations identified as the Alaska Scallop Fishery Management Plan, 5 AAC 38.076 (Barnhart, *In Press*).

Some Alaska weathervane scallop fishery participants formed a vessel cooperative program prior to the 2000/2001 regulatory season. Within this cooperative, vessel owners allocate vessel shares based primarily on fishing history. Some owners opted to remove their boats from the fishery and arranged for their coop shares to be caught by other vessels within the cooperative. Not all fishery participants are members of the cooperative.

The cooperative has led to fewer vessels in the fishery, so it is important that all remaining vessels have observer coverage in order to collect adequate data to manage the fishery and ascertain its impacts.

Onboard observer coverage is funded by industry through direct payments to independent contracting agents. Independent contracting agents provide the onboard observers who are trained at the University of Alaska North Pacific Fisheries Observer Training Center (OTC) in Anchorage, Alaska, and observer training costs are funded via a federal grant awarded annually to OTC.

In summary, under 5 AAC 38.076 (g) of the Alaska Scallop Fishery Management Plan “The department may require a vessel fishing in the scallop fishery to carry an observer unless the department determines that carrying an observer will not serve the purpose of the onboard observer program.” Carrying an observer does serve the purpose of the scallop program. Data collected from the scallop fishery are used to manage the fishery inseason, set guideline harvest ranges (GHRs) for the following seasons, monitor crab bycatch and ensure established crab bycatch caps are not exceeded, provide for regulatory enforcement, and answer a host of questions about catch composition, bycatch, habitat, and the health of the scallop resource. These data are necessary to achieve the requirements set out in the Magnuson-Stevens Act and the Federal Fisheries Management Plan for the Scallop Fishery off Alaska including the sustained yield of the shellfish resource without overfishing. In most areas of the state, the department does not conduct scallop stock assessment surveys, so observer-collected data are even more vital to the management of the resource. In areas where fishery independent assessment surveys do occur, fishery data provides another perspective on the health of the stock.

SHELLFISH OBSERVER PROGRAM REGULATIONS AND GUIDELINES

Shellfish Observer Program guidelines were originally defined by the BOF in 1988. Current guidelines defining the responsibilities of each group (ADF&G, observer companies, observers and vessels) involved in the observer program can be found in the Alaska Statutes Title 16, AS 16.05.050 POWERS AND DUTIES OF THE COMMISSIONER, AS 16.05.055 ON-BOARD OBSERVER PROGRAM, AS 16.05.251 REGULATIONS OF THE BOARD OF FISHERIES, Alaska Administrative Code, 5 AAC 39.141 ONBOARD OBSERVER PROGRAM, 5 AAC 39.142 CONFLICT OF INTEREST STANDARDS FOR ONBOARD OBSERVERS AND INDEPENDENT CONTRACTING AGENTS, 5 AAC 39.143 ONBOARD OBSERVER CERTIFICATION AND DECERTIFICATION, 5 AAC 39.144 ONBOARD OBSERVER INDEPENDENT CONTRACTING AGENT CERTIFICATION AND DECERTIFICATION, 5 AAC 39.146 ONBOARD OBSERVER BRIEFING AND DEBRIEFING, 5 AAC 39.645 SHELLFISH ONBOARD OBSERVER PROGRAM, and 5 AAC 39.646 SHELLFISH ONBOARD OBSERVER TRAINEE PROGRAM QUALIFICATIONS AND REQUIREMENTS.

ALASKA DEPARTMENT OF FISH AND GAME RESPONSIBILITIES

The Alaska Department of Fish and Game is responsible for establishing policies and procedures for certification and decertification of contracting agents and observers. To promote data consistency and reliability, ADF&G developed observer training standards and sampling methodology and protocols. Department personnel continue to develop the program with a progressive outlook towards future data integrity and meeting the management need for fisheries information.

INDEPENDENT CONTRACTING AGENT RESPONSIBILITIES

Independent contracting agent observer providers, also referred to as observer companies or contractors, are required by regulation to hire, train, deploy, and logistically support their observers with food, accommodations, sampling equipment and transportation. Observer companies secure contracts for observer services directly with vessel owners or the department, depending on the funding source for observer coverage. In 2004, four independent contracting agents were authorized to provide onboard observers: Alaskan Observers, Inc. (AOI), Northwest Observers Inc. (NWO), Saltwater Inc. (SWI) and Techsea International (TSI).

OBSERVER RESPONSIBILITIES

Observer qualifications include a minimum of a Bachelor's degree in the sciences of biology or any branch of biology, a valid National Marine Fisheries Service (NMFS) observer certification, or other fisheries related experience or education. Observer candidates are required to undergo ADF&G approved training and must demonstrate 90% proficiency on the ADF&G shellfish observer written examination. As part of their training, crab observers must also participate in a practical training exercise administered by the observer program staff in Dutch Harbor. As representatives of ADF&G, observers are required to adhere to a detailed set of professional standards outlined in regulation. Prior to 1991, observer companies provided observer training. Currently, the OTC conducts crab and scallop observer training. This facility is operated through funds provided by the University of Alaska Sea Grant Program. The OTC also trains groundfish fisheries observers for NMFS.

VESSEL OWNER AND OPERATOR RESPONSIBILITIES

Regulations require the cost of observers to be borne by the shellfish industry or funded through ADF&G cost-recovery fishing. When required, vessel owners and operators are to procure and pay for observers through a qualified observer contractor and provide their observer with food and accommodations equal to that of the vessel's crew. The vessel must also dedicate a safe work area, necessary totes to hold the contents of sampled pots, and allow the observer opportunity and time to adequately sample the catch according to specific ADF&G data collection requirements. Accurate fishing effort and harvest data are to be provided daily to the observer as well as access to communication equipment.

The MSFCMA and ADF&G commercial shellfish fishing regulations require that a vessel carrying an observer meets United States Coast Guard (USCG) commercial fishing vessel safety standards and possesses a current Commercial Fishing Vessel Safety Examination (CFVSE) decal. Whenever possible before a fishery, USCG personnel will board and examine safety equipment on vessels that carry observers. Although a vessel possesses the CFVSE decal, the vessel's safety equipment may not meet the USCG requirements, usually because equipment currency dates have expired since the last CFVSE.

OBSERVER DUTIES

Observers record retained daily catch, fishing effort and location, and periodically report vessel and observer activity to ADF&G. Reports are coded and given via radio, marine satellite, or telephone. Scallop observers report scallop harvests, number of tows, areas fished and crab bycatch. Crab observers report number of pots pulled, number of crab caught, and number of pots sampled.

Crab observers sample the retained catch and bycatch in a specified number of randomly selected pots each day. Scallop observers randomly select a specified number of dredges each day to sample species composition, crab/halibut bycatch, and discarded/retained scallop catch.

Observers may also be assigned projects such as collecting shellfish, finfish and other marine specimens, gathering tissue specimens for genetic stock identification, and the morphometric data collection of non-retained crabs. Observers also facilitate the tag-recovery studies of crabs and document specific seabird and mammal observations.

Shellfish observers regularly monitor fishing operations for regulatory compliance. The Alaska Department of Public Safety, Bureau of Wildlife Enforcement (ABWE) assists OTC and ADF&G staff with instruction of observers for evidence collection, handling procedures and proper chain-of-custody documentation. In the event that a potential violation is encountered, the ABWE will interview the observer and usually request a written statement. Observers are also required to confirm that the vessel is displaying a current CFVSE decal and that safety equipment on the vessel is current and in usable condition. This inspection is made when the observer first boards the vessel.

Crab Catcher-Processor Vessel

Daily duties specific to C/P vessel observers are: 1) interview the vessel operator for confidential catch and effort information, 2) conduct pot sampling of a specified number of randomly selected pots for retained catch and bycatch, 3) size frequency sampling of up to 100 randomly selected retained crabs for the purpose of determining carapace size and shell age distribution, 4) obtain average weights from a specified number of crab, and 5) obtain size, sex, and species compliance monitoring through a legal tally of 600 retained crabs conducted throughout the day. Observers are also asked to obtain processed crab section counts and case weights in the factory to verify catch data supplied by the vessel operator.

Crab Floating Processor Vessel

Sampling duties specific to floating processor (F/P) vessel observers are: 1) interview the delivering vessel's skipper for confidential catch and effort information, 2) determine average weight of retained crabs, 3) conduct size frequency sampling of 100 retained crabs for carapace size and shell age distribution, and 4) obtain size, sex, and species compliance monitoring through a legal tally of 600 retained crabs during the offload. Sampling duties are conducted on all vessels delivering to the processor.

Crab Catcher-Only Vessel

Daily observer duties specific to C/Vs include: 1) interviewing the vessel operator for confidential catch and effort information, and 2) conducting samples of a specified number of randomly selected pots for retained catch and bycatch. During deliveries, the observer: 1) determines the average weight of retained crabs, 2) collects a size frequency sample of up to 100 randomly selected retained crabs for the purpose of determining carapace size and shell age distribution, and 3) monitors size, sex, and species compliance through a legal tally of 600 crabs in the live tank.

Scallop Catcher-Processor Vessel

Daily observer sampling duties on board a scallop vessel involve: 1) conducting a species composition assessment of a specified number of randomly selected tows, 2) measuring shell height and weighing 20 retained scallops per bycatch sample tow, 3) collecting scallops for shell-aging, 4) enumerating, measuring and assessing the condition of commercially important crab species, Pacific halibut and scallops from a specified number of randomly selected tows, and 5) conducting a detailed examination of the discarded scallop catch. In addition to biological data, observers also collect and summarize a variety of fishery-based data including statistical areas fished, total minutes of all fished hauls, total minutes of all bycatch sampled hauls, and pounds of scallop meats retained (Barnhart and University of Alaska Anchorage, 2004).

PROGRAM REVIEW

OBSERVER COVERAGE AND COST-RECOVERY FUNDS

In addition to requirements for observer coverage on at-sea processing vessels, the BOF has given ADF&G the regulatory authority to deploy crab observers on an adequate number of C/Vs in each BSAI crab fishery. This regulatory authority allows ADF&G to collect much needed biological and fishery-based data necessary for resource management. It has also allowed ADF&G to meet requirements of the MSFCMA and the Fishery Management Plan for Bering Sea/Aleutian Islands King and Tanner crabs (NPFMC 1998). During their meeting in the spring of 1999, the BOF appointed the COOTF to report and be advisory to the BOF, and interact with and be advisory to the department. The department meets annually with the COOTF to review test-fish fund expenditures and observer coverage levels in certain BSAI fisheries.

The COOTF and ADF&G agreed to lower the coverage goals for catcher-vessels in fiscal year 2005. This was due, in part, to the loss of state general funds to support the observer program staff. Observer program staff is now funded from the test fishery budget. ADF&G's goal for the 2004/2005 season was to deploy observers on 8% of C/Vs in two vessel size categories, between 75 ft and 125 ft, and greater than 125 feet, with a minimum of five observers per vessel size category in selected fisheries. Since 2000, the goal was 10% observer coverage in the selected fisheries. ADF&G deploys seasonal biologist staff observers, and additional observers are obtained through a State of Alaska contract with observer providers. Observer coverage levels for 2004 are depicted in Figure 3-1.

Observer coverage levels remained at 100% and funded under the pay-as-you-go system for at-sea processors participating in BSAI king or Tanner crab fisheries, for all vessels in the Aleutian Islands king crab fisheries, and for all vessels participating in hair crab, deep water king crab, and deep water Tanner crab fisheries under a commissioner's permit. Likewise, observer coverage for vessels in the CDQ and AFA fisheries remained under the pay-as-you-go system (Table 3- 1).

The Shellfish Onboard Observer Program has utilized test-fish funding for a portion of the BSAI observer coverage costs since 1999 (Tables 3-2 and 3-3). The test-fish authority was originally capped at $650,000 and structured as a revolving fund, which, if not used in one fiscal year, may be rolled into and available in the following fiscal year. A total of $669,500 in test-fish funds was collected for the cost-recovery funded portion of the observer program from the harvest and sale of red king crab after the close of the 1999 Bristol Bay red king crab fishery. In 2000, the ADF&G and COOTF agreed that if the cost-recovery fund dropped below $300,000, a test fishery would be conducted to replenish it. The observer test-fish fund balance at the end of fiscal year 2005 was expected to fall below $300,000. Consequently, the department conducted a cost-recovery test-fish charter after closure of the 2004 Bristol Bay red king crab general fishery. A total of $572,240 was collected to fund observer deployments for the Bristol Bay red king crab and Bering Sea snow crab general fisheries, as well as the crab observer program staff (Table 3 - 3).

2004 OBSERVER PROGRAM ACTIVITY

Shellfish observer activities in this section of the report are documented by calendar year. The length of an observer deployment is defined in observer-days. An observer-day is any day between and including the observer's briefing and debriefing. One observer-month is equivalent to 30 observer-days. The length of an observer deployment is the number of observer-days between and including the observer's briefing and debriefing.

OBSERVER TRAINING, CERTIFICATION, AND DECERTIFICATION ACTIVITY

Since the inception of the observer program in 1988, 38 crab observer classes have been held, resulting in the dispersion of 528 trainees into the field. During 2004, one crab observer training class was conducted at the OTC in Anchorage. At the end of 2004, 55 crab observers either held a trainee permit or were certified in the crab observer program. The observer turnover in 2004 was 28%, up from 23% in 2003. During 2004, 16 observer certifications lapsed due to 12 months of inactivity, and five trainees were not certified and their trainee permits expired. Crab observer training and participation levels from 1988 to 2004 are summarized in Table 3-4.

One scallop observer training class was held at the OTC during 2004. Three trainees were issued permits, of which two received full certification and one certification was pending at the end of 2004. Conversely during 2004, seven scallop observer certifications lapsed due to 12 months of inactivity, resulting in a 39% turnover rate. No scallop observers were decertified for failure to comply with observer program standards. Eight certified scallop observers remained in the program as of December 31, 2004. Scallop observer training and participation levels from 1993 to present are summarized in Table 3-5.

Shellfish Observer Deployment Activity

The Shellfish Observer Program continues to develop its procedures and policies with data integrity as the primary goal. Over the years ADF&G has found a need to increase the length of observer sessions (briefing, midtrip debriefing, debriefing) from the minimum 15 minutes to two or more hours in order to keep pace with data needs and data quality issues. Data requests have become more complex, and additionally, deployment dynamics and vessel differences more varied.

Observer deployment activity in 2004 decreased significantly from the previous year. In fact, 2004 ranks third lowest in the history of the program in terms of number of observer trips and sessions, and records the fewest observer-months since 1988 (Table 3-6). Seventy-nine vessels were observed during the course of the year, and despite record lows in observer participation, the number of vessels carrying observers remained one of the highest documented. Even though fleet coverage for the Bristol Bay red king and Bering Sea snow crab fisheries has expanded since 1999, fishery closures, shorter seasons in the major fisheries and the decrease in vessel participation has decreased total observer time.

Spikes of observer activity occurred during the months of January and October, coinciding with the Bering Sea snow crab and Bristol Bay red king crab fisheries (Table 3-7 and Figure 3-2). Observers participating in the combined red king crab fisheries, including Bristol Bay general and CDQ fisheries, accounted for 86 (30%) of the 283 total number of observer sessions in 2004 (Table 3-8). The Bering Sea snow crab general and CDQ fisheries followed a close second with 29% of observer sessions. A total of 134 briefings, 14 midtrip debriefings, and 135 debriefings were conducted in 2004.

OBSERVER DEPLOYMENTS BY FISHERY

Observer coverage goals and requirements were met in most fisheries, with a total of 132 deployments, accumulating 118 observer-months (Table 3-9). Forty-three percent of the observer-months were in deployments during the 2004/2005 Aleutian Islands golden king crab *L. aequispina* fishery. Crab and scallop observers conducted a combined 16,774 pot and dredge samples for species composition, establishing an overall sampling rate of 5.8% (Table 3-10).

Shellfish observer vessel assignments and deployments in this section of the report are documented by fishing season.

2003/2004 Aleutian Islands Golden King Crab Fishery Observer Activity

The 2003/2004 Aleutian Islands golden king crab fishery opened at noon on August 15, 2003 with 21 vessels, including one C/P and 20 C/Vs. Observer coverage was mandatory for all participating vessels, and observers were secured and paid for directly by the vessels. Due to unforeseeable circumstances surrounding an observer and contractor error, two vessels were without assigned observers just prior to the opening of the fishery. To avoid delaying their entrance into the fishery, both vessels entered into revenue contracts with the State of Alaska in which the department supplied two certified ADF&G crab observers. In addition, Saltwater Inc., AOI, DCI and TSI provided observers throughout the season for 31 total deployments.

Thirty-one observer briefings took place between August 7 and December 29, 2003, with 27 and 4 occurring in Dutch Harbor and Adak, respectively. Twenty-two of these briefings took place in Dutch Harbor over a one-week period in August for the opening of the fishery in both the eastern and western management areas. Twenty-five observers boarded their assigned vessels in Dutch Harbor, five boarded in Adak and one observer boarded in Nikolski.

Sampling duties varied by vessel type and fishing location. For vessels fishing east of 174° W longitude, C/V observers were assigned four measurement and ten count sample pots per fishing day. Harvest information and sampling effort was reported tri-weekly. For vessels fishing west of 174° W longitude, C/V observers were assigned six measurement and four count pots per fishing day and C/P observers were assigned five measurement sample pots per fishing day. Reports were transmitted on a weekly basis until a few weeks prior to the closure announcement, at which time report periods increased to tri-weekly. Observers were to report all tagged golden king crab recovered, and those participating in the western management area were also required to measure and document all red king crab bycatch from all pots pulled.

The eastern management area of the 2003/2004 Aleutian Islands golden king crab fishery closed at noon on September 8, 2003, and 17 debriefings occurred in Dutch Harbor between August 18 and September 12, 2003. The western management area closed five months later at noon on February 6, 2004. Another 14 debriefings were held during and after the season in either Dutch Harbor or Adak, with the last debriefing occurring February 19, 2004. Eleven midtrip debriefings occurred in Dutch Harbor throughout the course of the fishery. In summary, 31 briefings, 11 midtrip debriefings and 31 final debriefings were conducted throughout the fishery. Twenty-four observers disembarked in Dutch Harbor, six disembarked in Adak and one in Nikolski.

During the 1,400 deployment days, observers sampled 7,294 (5.8%) of the 125,119 pots pulled by the entire fishing fleet. Observers on C/Vs sampled 6,744 pots and completed 73 legal tallies and 73 size frequency samples, and observers on the C/P sampled 550 pots and completed 115 legal tallies and 115 size frequency samples (Table 3-11). Observers and crewmembers collectively recovered 334 golden king crab tags and no evidence was collected for regulatory non-compliance. Observers reported 283 red king crabs caught in all pots pulled west of 174° W longitude.

In Area O, *Lithodes couesi* may be retained under the conditions of a commissioner permit when longlining for golden king crab. Observers sampling *L. couesi* follow the sampling and tallying guidelines established for the golden king crab fishery, but maintain separate reporting forms for any *L. couesi*. Since the Aleutian Islands *L. couesi* registrations have all been issued in conjunction with the directed Aleutian Islands golden king crab fishery, fishing and observer sampling effort for *L. couesi* king crab are indistinguishable from the golden king crab fishery and therefore not reported. One legal tally (18 crabs) and one size frequency sample (2 crabs) was conducted on retained *L. couesi* king crab.

2004/2005 Aleutian Islands Golden King Crab Fishery Observer Activity

The 2004/2005 Aleutian Islands golden king crab fishery opened at noon on August 15, 2004 with 22 vessels, including one catcher-processor and 21 catcher vessels. Observer coverage was mandatory for all participating vessels and observers were secured and paid for directly by the vessels. Saltwater Inc., AOI and TSI provided observer coverage throughout the season for 27 total deployments.

Twenty-seven observer briefings took place between August 10 and December 6, 2004, with 24 occurring in Dutch Harbor and three in Anchorage. Twenty-three of the Dutch Harbor briefings were conducted over a five-day period in August for the opening of the fishery in the eastern and western management areas. Twenty-one observers boarded their assigned vessels in Dutch Harbor and six boarded in Adak.

For vessels fishing east of 174° W longitude, C/V observers were assigned four measurement and ten count pots per fishing day. Harvest information and sampling effort was reported tri-weekly. For vessels fishing west of 174° W longitude, C/V observers were assigned six measurement and four count pots per fishing day and C/P observers were assigned five measurement pots per day. Sampling duties varied by area and vessel type due to differences in fishery performance and fishing activities. Reports were transmitted on a weekly basis until a few weeks prior to the closure announcement, at which time report periods increased to tri-weekly. Observers reported all tagged golden king crab recovered, and those participating in the western management area were also required to measure and document all red king crab bycatch from all pots pulled.

The eastern management area of the 2004/2005 Aleutian Islands golden king crab fishery closed on August 29, 2004. The western management area closed five months later at noon on January 3, 2005. One midtrip debriefing occurred in Dutch Harbor during the fishery. Twenty-six final debriefings took place in Dutch Harbor and one occurred in Anchorage between August 30, 2004 and January 11, 2005. Seventeen of the 27 debriefings occurred August 30 – September 6, 2004. Twenty observers disembarked in Dutch Harbor and seven disembarked in Adak.

The entire fleet fished for 577 days, pulled a total of 91,694 pots, delivered 5,575,051 pounds of golden king crab and made 83 landings to five different processors (Table 3-10). Catch information by vessel type is confidential because only one C/P participated in the fishery. Observers sampled 4,825 (5.3%) of the pots pulled by the entire fishing fleet. Observers on C/Vs were deployed for a total of 1,375 days, sampled 4,408 pots and completed 63 legal tallies and 61 size frequency samples. Observers on the C/P were deployed for 146 days, sampled 417 pots and completed 100 legal tallies and 100 size frequency samples (Table 3-11). No evidence of violations was collected during this fishery. Twenty-six golden king crabs tagged in 2000, and 223 crabs tagged in 2003 were recovered during the fishery. Observers reported 209 red king crabs caught in all pots pulled west of 174° W longitude.

In Area O, *Lithodes couesi* may be retained under the conditions of a commissioner permit when longlining for golden king crab. Observers sampling *L. couesi* follow the sampling and tallying guidelines established for the golden king crab fishery, but maintain separate reporting forms for any *L. couesi*. Since the Aleutian Islands *L. couesi* registrations have all been issued in conjunction with the directed Aleutian Islands golden king crab fishery, fishing and observer sampling effort for *L. couesi* king crab are indistinguishable from the golden king crab fishery and therefore not reported.

2004 Bering Sea Snow Crab General Fishery Observer Activity

The 2004 Bering Sea snow crab general fishery opened at noon on January 15, 2004 with 192 vessels, including 183 C/Vs, 6 C/Ps and 3 F/Ps. Two C/Ps took crab deliveries and processed crab as floating-processors after the fishery closure. The department set a goal of 10% observer coverage for the C/V fleet, and employed six staff biologists and contracted 12 observers from SWI and AOI. The C/Vs that carried observers were chosen at random from the preseason vessel registration list and observer costs paid through the state's test-fish project. One hundred percent observer coverage was mandatory for C/Ps and F/Ps and observers were secured and paid for by the vessels. Alaskan Observers, Inc., SWI, TSI and NWO provided nine observers for the C/Ps and F/Ps.

Eight C/Vs pre-registered late, and in accordance to department policy, were required to carry an observer for the duration of the season. Because eight vessels entered the fishery after pre-registration, increasing the fleet size from 175 to 183 catcher-only vessels, one additional observer was secured in order to maintain the 10% observer coverage level.

Many communication challenges arose due to the number of late registries. As each new vessel registered, one of the original vessels was dropped from the observer list. Vessels and contractors had to be immediately notified of the changes. This occurred on an almost daily basis from December 30 until January 6, causing continuous changes to observer travel plans and some confusion among the vessels originally selected. Six or 32% of the 19 vessels carrying observers at the start of the fishery were late registrants.

Briefings for 21 of the 28 observers took place in Dutch Harbor from January 10-12. Six observers who were scheduled to board their vessels in ports other than Dutch Harbor were briefed in Anchorage by department staff on January 10 and 11. One observer was briefed in Dutch Harbor for deployment on a floating processor on January 16. Twenty-one observers boarded their vessels in Dutch Harbor, two boarded in Akutan, two boarded in King Cove and three in St. Paul.

Observers on C/Vs were assigned a pot-sampling goal of one measurement and five count pots per fishing day and observers on C/Ps were assigned one measurement and three count pots. All observers reported harvest and effort information every 24 hours to the department.

The fishery closed at 10:00 PM on January 23, 2004. Sixteen observers disembarked in Dutch Harbor, two in Akutan, two in King Cove, six in St. Paul and one remained on the same vessel for another crab fishery. One observer disembarked in Seattle after a freight haul on a C/P. Debriefings were performed for 31 deployments from January 26 to February 6 in Dutch Harbor.

The fleet pulled a total of 110,087 pots for the entire fishery, made 240 deliveries and landed 22,169,550 pounds of snow crab during the Bering Sea snow crab season. The observed C/Vs pulled 11,067 pots, made 25 deliveries and landed 2,421,672 pounds of crab. The C/Ps pulled 3,943 pots, made 11 deliveries and landed 666,027 pounds of crab (Table 3-10).

During 603 deployment days observers sampled a total of 847 pots, which represented 5.6% of pots pulled on observed vessels. Catcher vessel observers sampled 688 of 11,067 pots pulled on observed C/Vs (6.2%) and conducted 19 size frequency samples and 19 legal tallies. Observers on C/Ps sampled 159 of 3,943 pots pulled (4.0%) and conducted 44 size frequency samples and 44 legal tallies. Observers on all vessels sampled a total of 0.77% of all pots pulled by the fleet. Observers on F/Ps performed 58 size frequency samples and 59 legal tallies on retained catch (Table 3-12). Due to a long wait time, one observer was allowed to disembark his vessel before offload and the F/P observer performed the observer duties. No tagged crabs were gathered and evidence of violations was collected on two vessels.

2004 Bering Sea CDQ Snow Crab Fishery Observer Activity

The 2004 Bering Sea CDQ snow crab fishery opened to registration on January 26, 2004. The six CDQ groups eligible to fish participated with nine catcher-only vessels and one catcher-processor. Each group was responsible for securing observers through a state-certified observer contractor and for all observer costs. The observer coverage level was fixed at two observed vessels per CDQ group, with the exception of the C/P, where 100% observer coverage is mandatory. All vessels were observed throughout the duration of the fishery as no group had more than two vessels harvesting crab at any one time.

Alaskan Observers Inc., NWO, SWI and TSI supplied observers for the CDQ groups. All observer briefings took place between January 28 and February 16, 2004. Eight observers boarded in Dutch Harbor, one boarded in Akutan and one boarded in St. Paul.

Observers on C/Vs were assigned a sampling goal of one measurement pot and five count pots per fishing day, and the observer on the C/P was assigned one measurement and three count pots. Harvest and effort information was reported to the department every Monday.

The last delivery for the 2004 Bering Sea CDQ snow crab fishery occurred March 20, 2004. Eight observers disembarked in Dutch Harbor, one disembarked in Akutan and one in St. Paul. Debriefings for all observers took place in Dutch Harbor between February 23 and March 22, 2004.

The Bering Sea snow crab CDQ fleet took 186 fishing days (combined actual fishing days of the entire fleet) to harvest their catch and delivered 1,770,774 pounds of snow crab in 25 separate landings. During 309 deployment days, observers conducted 61 size frequency samples, 56 legal tallies and sampled 780 of the 13,622 pots (5.7%) pulled by the entire fleet (Table 3-13). Catch and sampling information by vessel type is confidential because only one C/P participated in the fishery. No evidence of violations or tagged crab were collected during this fishery.

2004 Bering Sea Golden King Crab Fishery Observer Activity

The 2004 Bering Sea golden king crab fishery opened on January 1, 2004. Five catcher-only vessels registered to fish the Pribilof District. No vessels registered to fish the Northern District. One hundred percent observer coverage was mandatory on all vessels and observers were secured and paid for by the vessels.

From February 19 through March 5, 2004, five briefings were conducted in the Dutch Harbor office, and all observers boarded their vessels in Dutch Harbor. Saltwater Inc., AOI and TSI provided observer coverage. All observers were assigned a sampling goal of ten measurement pots per fishing day. Tri-weekly harvest information and sampling effort was reported to the department.

The 2004 Bering Sea golden king crab fishery closed March 12, 2004 for the Pribilof District, and the last delivery occurred March 14. All observers disembarked and debriefed in Dutch Harbor between March 6–16. Harvest information (Table 3-10) is confidential because only two processors participated in the fishery. During 102 deployment days, observers conducted seven size frequency samples, seven legal tallies and sampled 551 of 2,312 pots (23.8%) pulled by the entire fleet (Table 3-14). No evidence was collected during this fishery.

2004 Bristol Bay Red King Crab General Fishery Observer Activity

The 2004 Bristol Bay red king crab fishery opened at 4:00 PM on October 15 with 252 vessels, including 243 C/Vs, eight C/Ps and one F/P. Three C/Ps participated as floating-processors at the closure of the fishery. Of the 243 C/Vs, 32 were AFA vessels. The department set a goal of 8% observer coverage for the catcher-only fleet. Observer costs for the non-AFA vessels were paid through the state's test-fish project and AFA vessel observers were secured and paid for directly by the vessels. One hundred percent observer coverage was mandatory for the C/Ps and the F/P, and those observers were secured and paid for directly by the vessels.

The department employed five staff observers and contracted 12 observers from SWI and TSI for the non-AFA C/V fleet. Three observers were contracted from SWI for the AFA vessels. Saltwater Inc, NWO, AOI and TSI provided nine observers for the catcher-processors and floating processor.

Briefings for 26 of the 33 observer trips occurred in Dutch Harbor October 9-14, 2004. Six observers who boarded their vessels in ports other than Dutch Harbor were briefed in Anchorage by department staff on October 12. One observer was rebriefed in Dutch Harbor on October 20 for a freight haul to Seattle. Two certified observers were double-briefed for both the Bristol Bay red king crab general fishery and the Bristol Bay red king crab CDQ fishery. Twenty-one observers boarded in Dutch Harbor, two boarded in Akutan and six in King Cove.

Observers on C/Ps and C/Vs were assigned a sampling goal of 10 measurement pots per fishing day. This assignment proved to be too much for the C/P observers to complete each day due to other required observer duties on a C/P. Catcher-vessel observers were able to satisfactorily complete this daily sampling goal. All observers reported harvest information and sampling effort twice daily to the department.

The fishery closed at 11:59 PM on October 18, 2004. Seventeen observers disembarked in Dutch Harbor, one disembarked in Akutan, one in False Pass, four in King Cove, one in Kodiak, one in Sand Point, one in Seattle after a freight haul, and three remained on their vessels to observe in other fisheries. One observer was given a waiver by the department to disembark her vessel prior to offloading in order to be expedited to the Bristol Bay red king crab CDQ fishery. The vessel delivered to a floating processor where the F/P observer completed the offload duties. Debriefings were performed for all observer trips in Dutch Harbor from October 20 to November 9.

The fleet pulled a total of 90,972 pots for the entire fishery, made 270 deliveries and landed 14,112,438 pounds of crab during the Bristol Bay red king crab season. Observers sampled a total of 536 pots, representing 5.1% and 0.6% of pots pulled on observed vessels and the entire fleet, respectively (Table 3-10).

The 211 non-AFA C/Vs pulled 79,539 pots, made 223 deliveries and landed 12,043,862 pounds of red king crab. Observers sampled 339 (5.4%) of the 6,304 pots pulled by the observed vessels and conducted 16 size frequency samples and 16 legal tallies during 198 deployment days. The 32 AFA C/Vs pulled 8,093 pots, made 33 deliveries and landed 1,462,535 pounds of crab. Observers sampled 67 (8.0%) of the 842 pots pulled on observed AFA vessels, and conducted three size frequency samples and three legal tallies in 33 deployment days.

The C/Ps pulled 3,370 pots, made 14 deliveries and landed 606,041 pounds of crab (Table 3-10). Three C/Ps took a total of 15 deliveries from C/Vs at the closure of the fishery. Observers on C/Ps had a combined 84 deployment days, sampled 130 (3.9%) of 3,370 pots pulled and conducted 17 size frequency samples and 17 legal tallies. Observers on F/Ps performed 31 size frequency samples and 33 legal tallies (Table 3-15).

Observers reported 18 of the 74 red king crab tags retrieved during the fishery (24.3%) and evidence of violations was collected on two vessels.

2004 Bristol Bay Red King Crab CDQ Fishery Observer Activity

The 2004 Bristol Bay CDQ red king crab fishery opened to registration on October 22, 2004. The six CDQ groups eligible to fish participated with 10 C/Vs and 2 C/Ps. The mandatory observer coverage was one observer per CDQ group for catcher vessels. All C/Ps were required to carry an observer, and groups using more than one catcher-only vessel were responsible for determining which vessel would carry the observer. Each group was responsible for securing an observer through a state-certified observer contractor and for all observer costs.

Eight vessels, two of which were C/Ps, carried observers for the fishery. Alaskan Observers, Inc., TSI, SWI and NWO provided eight observers for the CDQ groups. Observer briefings were conducted in Dutch Harbor between October 12 and October 26, 2004. Four observers boarded their vessels in Dutch Harbor and one in Akutan. Three observers remained on their vessels after the closure of the Bristol Bay red king crab general fishery.

The sampling goal for each C/V and C/P deployment was 10 measurement sample pots for each day of fishing. Harvest and effort information was reported tri-weekly to the department.

The last delivery for the 2004 Bristol Bay CDQ red king crab fishery occurred on November 15, 2004. Seven of the observers disembarked in Dutch Harbor and one disembarked in Akutan. Debriefings for the eight CDQ observers took place in Dutch Harbor November 5-15, 2004.

The Bristol Bay red king crab CDQ fleet took 90 fishing days (combined actual fishing days of the entire fleet) to harvest their catch and pulled 5,359 pots and made 21 deliveries, totaling 1,133,013 pounds of red king crab. Harvest information by observed vessel type (Table 3-10) is confidential because only two C/Ps participated in the fishery. Observers sampled 226 (5.2%) of the 4,312 pots pulled by observed vessels and 4.2% of pots pulled by the entire CDQ fleet (Table 3-16). After eight observer trips and 142 deployment days, observers had conducted 23 size frequency samples and 23 legal tallies. Observers reported eight of the nine red king crab tags retrieved during the fishery(88.9% of all tags recovered). No evidence was collected during this fishery.

2004 Bristol Bay Golden King Crab Fishery Observer Activity

One catcher-only vessel registered to fish Bristol Bay golden king crab in 2004. One hundred percent observer coverage was mandatory for this fishery and the observer was secured and paid for by the vessel. Saltwater, Inc. provided one observer who was briefed in Dutch Harbor on March 16, 2004. All catch information (Table 3-10) is confidential because only one vessel participated in the fishery. After seven observer deployment days, 10 pots were sampled and no evidence of violations reported. The observer was debriefed in Dutch Harbor on March 22 and boarded and disembarked the vessel in Dutch Harbor.

2004 Statewide Grooved Tanner Crab Fishery Observer Activity

In 2004, two catcher-only vessels registered to fish for grooved Tanner crab. Three deepwater Tanner crab permits were issued: two for Area J/Bering Sea District and one for Area M/South Peninsula. Under the conditions of the commissioner's permit, the vessel could retain triangle crab and scarlet king crab as bycatch. This fishery requires 100% mandatory observer coverage, which is secured and paid for directly by the vessels.

Saltwater Inc. and TSI provided three observers during the course of the fishery. All observers boarded and disembarked their vessels in Dutch Harbor. All observer briefings, midtrip debriefings and final trip debriefings occurred in Dutch Harbor, with the first briefing on March 22 and the last debriefing on June 30, 2004.

Observers were assigned a sampling goal of ten measurement pots per fishing day. A set number of experimental pots with no escapement mesh were required, and observers were instructed to target-sample these pots. Observers also collected data on Tanner crab male chela heights and female abdominal widths in each sample pot for size-of-maturity research in each sample pot. Harvest and fishing effort information was reported tri-weekly to the department.

During 150 observer-days, the observers conducted 14 legal tallies, 18 size frequency samples and sampled 628 pots (Table 3-17). Fishing effort and harvest information (Table 3-10) is confidential because only two vessels participated in the fishery. No evidence of violations was collected for this fishery.

2004 Norton Sound Red King Crab Fishery Observer Activity

No observer activity occurred in this fishery in 2004.

2004/2005 Weathervane Scallop Fisheries Observer Activity

The 2004/2005 scallop season opened on July 1, 2004 in all state and federal waters, except in the Cook Inlet Registration Area, which opened August 15. Throughout the 7.5-month regulatory season, two C/Ps fished in four registration areas, including Yakutat, Prince William Sound, Kodiak and the Bering Sea. A third vessel registered and deployed, but did not engage in fishing activities. All vessels were required to carry onboard observers 100% of the time exept in Cook Inlet where the third-party observer requirement was waived provided the participants accommodate an ADF&G observer when requested. Observers were secured and paid for by vessel operators through independent contracting agents. During the 2004/2005 scallop season, SWI and AOI provided all observers for the 12 deployments throughout the season.

The first briefing occurred in Dutch Harbor on July 1, 2004 for the Bering Sea Registration Area. Eleven additional briefings, six mid-trip debriefings and twelve final debriefings were conducted throughout the year in Kodiak, Prince William Sound, and Yakutat. The last debriefing was held February 17, 2005 in Kodiak.

Scallop C/Ps normally engage in fishing activity 24 hours per day. Two dredges are fished simultaneously, one on the port side and one on the starboard side. Observers were assigned a goal of sampling one dredge from six different tows per day. One dredge is sampled each day for species composition and five dredges are sampled for crab/halibut bycatch and discarded/retained scallop catch monitoring, including collecting scallops for shell-aging. Observers reported scallop harvest, crab bycatch, fishing effort and location information to ADF&G on a tri-weekly basis. Bycatch of Tanner crabs, snow crabs, Dungeness crabs, red king crabs, and Pacific halibut are estimated from observer data.

For the 2004/2005 regulatory season, observers made 12 trips, accounting for 11.3 deployment months, the lowest since inception of the scallop observer program in 1993 (Table 3-18). Four of the twelve observer trips were made in the Kodiak registration area, and accounted for 49% of the total observer-months (Table 3-19). No evidence was collected on any of the trips.

2004 Fisheries Evidence Collected by Observers

Shellfish observers collected evidence associated with potential illegal activities on four observer trips in 2004. Evidence was collected in the Bering Sea snow crab fishery, the Aleutian Islands golden king crab fishery, and the Bristol Bay red king crab general and CDQ fisheries. Of the four cases, warnings were issued in two cases, and the others are under investigation. Evidence collection remains low over the last five years, despite an overall increase in the catcher-only vessel coverage (Table 3-20).

OBSERVER DATA USE AND ANALYSIS

The MSFCMA mandates collection of reliable data for fisheries conservation and management. Although ADF&G continues to collect retained catch data shore-side, it relies on data collected on the fishing grounds by at-sea observers who are in a unique position to collect specific and accurate baseline data. The crab observer database has accumulated enough data to become an important source of objective information for fisheries management and research. Some of the applications of this data are discussed in Schwenzfeier et al., (2000). The observer program database staff summarizes the large volume of biological data collected by crab observers annually. The most recent summary and analysis of BSAI observer data is available in Barnard and Burt (2005).

Scallop observer-collected data are used to manage the fishery inseason and to set GHRs for the following season. Data are provided to local advisory committees, BOF, NPFMC, NMFS and the public to help answer a myriad of questions pertaining to the weathervane scallop fishery. Regulatory decisions, in the absence of observer-collected data, may have had different outcomes. These data have been invaluable for preparing Essential Fish Habitat and Habitat Areas of Particular Concern (HAPC) documents. Data from observer samples were particularly useful in showing that a proposed HAPC would have minimal impact. For analyzing fine-scale spatial impacts, observer data are critical. The most recent summary and analysis of the statewide scallop observer-collected data is available in Barnhart and Rosenkranz (2003).

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Table 3-1.-Observer coverage levels for the 2004/2005 BSAI crab fisheries.

Fishery	Preseason Registration Deadline[a]	Catcher Vessels[b] Observer Coverage	Catcher Vessels[b] Cost-Recovery Funded?	At-Sea Processors Observer Coverage	At-Sea Processors Cost-Recovery Funded?
St. Matthew blue king crab	24-Aug	Partial	YES	100%	NO
Pribilof red and blue king crab	24-Aug	Partial	YES	100%	NO
Bristol Bay red king crab	24-Sep	Partial	YES	100%	NO
Bering Sea Tanner crab	24-Sep	Partial	YES	100%	NO
Bering Sea snow crab	24-Dec	Partial	YES	100%	NO
St. Matthew golden king crab	none	100%	NO	100%	NO
Pribilof golden king crab	none	100%	NO	100%	NO
Hair crab	none	100%	NO	100%	NO
Triangle Tanner and grooved Tanner	none	100%	NO	100%	NO
Aleutian king crab (red or golden)	none	100%	NO	100%	NO

[a] When the pre-registration deadline occurs on a Saturday, Sunday, or state holiday, the deadline is extended to the next workday.

[b] AFA and CDQ catcher vessels are pay-as-you-go.

Table 3-2.-Shellfish onboard observer program test-fish cost-recovery harvest statistics, 1999-2004.

Year	Number of Landings	Number of Crabs	Harvest[a,b]	Number of Pots Pulled	Average CPUE[c]	Average Weight[a]	Deadloss[a]
1999 [d]	2	16,930	106,179	541	31.0	6.3	245
2000	No cost-recovery fishing						
2001 [d]	2	13,065	90,151	463	28.2	6.9	103
2002 [d]	1	10,837	71,661	198	54.7	6.6	134
2003	No cost-recovery fishing						
2004 [d]	2	16,414	111,620	704	24.1	6.8	72

[a] In pounds.

[b] Deadloss included.

[c] Number of legal crabs per pot lift.

[d] Cost-recovery fishing occurred after the Bristol Bay red king crab general fishery.

Table 3-3.-Economic performance of the shellfish onboard observer program test-fish cost-recovery harvest, 1999-2004.

Year	Harvest[a]	Exvessel Value			Charter Dates	Total Charter Days
		Test-fish[b]	General Fishery[b]	Total		
1999	105,934	$6.32	$6.26	$669,500	10/25-11/10	17
2000			No cost-recovery fishing			
2001	90,048	$5.12	$4.81	$461,045	10/23-11/08	17
2002	71,527	$6.41	$6.14	$458,488	10/17-10/27	10
2003			No cost-recovery fishing			
2004	111,548	$5.13	$4.71	$572,240	10/21-10/30	10

[a] In pounds, deadloss not included.

[b] Price per pound.

Table 3-4.-Crab observer training and participation in the Shellfish Onboard Observer Program, 1988 - 2004.

Year Class	Number of		Certified at Year's End[a]	Percent Turnover[b]	Certification Status for Year Class as of December 31, 2004		
	Classes	Trainees			Current[a]	Expired[c]	Other[d]
1988	3	82	81	1.0	0	67	15
1989	1	41	98	19.0	0	36	5
1990	3	27	121	3.2	0	25	2
1991	4	59	108	40.0	0	54	5
1992	3	40	104	29.7	1	38	1
1993	2	19	78	36.6	0	17	2
1994	1	14	65	29.3	0	11	3
1995	3	55	77	35.8	3	48	4
1996	3	36	72	36.3	3	33	0
1997	2	27	67	32.3	3	23	1
1998	2	22	54	39.3	3	19	0
1999	1	11	43	33.8	0	11	0
2000	2	14	37	35.1	4	10	0
2001	3	24	57	6.6	5	18	1
2002	2	27	67	20.2	14	11	2
2003	2	25	71	22.8	14	11	0
2004	1	5	55	27.6	5	0	0
Totals	38	528	NA	NA	55	432	41

[a] Represents all crab observers who hold a certificate or trainee permit.

[b] Calculated by the number of observers at the beginning of the year, plus observers certified throughout the year, compared to the number of observers certified at the end of the year.

[c] Due to 12-month shellfish observer employment inactivity or trainee permit expiration.

[d] Certification revoked for non-compliance with shellfish observer program standards.

NA = not applicable

Table 3-5.-Scallop observer training and participation in the Shellfish Onboard Observer Program, 1991 - 2004.

Year Class	Number of		Certifiedat Year's End[a]	Percent Turnover [b]	Certification Status for Year Class as of December 31, 2004		
	Classes	Trainees			Current [a]	Expired[c]	Other [d]
1993	3	23	22	4.0	0	22	1
1994	3	16	5	86.8	0	13	3
1995	0	0	2	60.0	0	0	0
1996	2	10	5	58.3	0	10	0
1997	2	10	7	53.3	0	10	0
1998	1	8	5	66.7	0	8	0
1999	1	9	5	64.3	0	8	1
2000	1	6	6	45.5	0	6	0
2001	1	6	9	25.0	1	5	0
2002	1	5	9	35.7	0	5	0
2003	2	6	10	33.3	4	2	0
2004	1	3	8	38.5	3	0	0
Totals	17	99	NA	NA	8	89	5

[a] Represents all scallop observers who hold a certificate or trainee permit.

[b] Calculated by the number of observers at the beginning of the year, plus observers certified throughout the year, compared to the number of observers certified at the end of the year.

[c] Due to 12-month shellfish observer employment inactivity or trainee permit expiration.

[d] Certification revoked for non-compliance with shellfish observer program standards.

NA = not applicable

Table 3-6.-Summary of observer deployment activity in the shellfish onboard observer program, from July 1988 through December 2004.

Year	Vessels [a]					Observer	Deployed	Certified at	Observer	Number of	Active
	C/P	F/P	C/V	S/V	Total	Trips	Observers	Year's End [b]	Months	Sessions [c]	Contractors
1988	21	6	0	0	27	46	28	80	31.4	89	6
1989	22	12	0	0	34	124	53	98	124.0	252	7
1990	26	15	0	0	41	140	61	121	163.5	268	7
1991	33	18	0	1	52	282	105	114	352.2	651	6
1992	32	19	2	0	53	225	100	105	280.3	531	7
1993	29	21	14	11	75	235	80	102	216.8	412	7
1994	24	17	19	12	72	185	74	87	178.8	350	7
1995	21	15	50	8	94	211	91	95	213.0	478	5
1996	16	13	38	5	72	209	82	80	250.5	491	5
1997	15	11	30	6	62	157	71	78	184.4	347	5
1998	13	11	44	8	76	186	62	65	203.1	382	5
1999	11	11	42	8	72	152	48	55	148.5	345	4
2000	9	6	62	6	83	154	48	45	128.0	335	3
2001	9	5	62	4	80	161	59	64	150.3	364	4
2002	10	6	85	4	105	199	70	75	158.8	429	5
2003	9	7	83	2	101	171	70	80	137.6	363	5
2004	10	6	60	3	79	134	50	55	103.6	283	4

[a] Unique vessels requiring observer coverage: C/P = Catcher-Processor, F/P = Floating Processor, C/V = Catcher-Only Vessel, and S/V = Scallop Vessel (C/P or C/V).

[b] Total number of observers who possess either a shellfish observer trainee permit or are currently certified on December 31st of each year.

[c] Includes briefings, midtrip debriefings and final debriefings.

Table 3-7.-Number of shellfish observer sessions by month and year, including briefings, midtrip debriefings and final debriefings, 1988 - 2004.

Year	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Yearly Total
1988	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	27	36	12	14	89
1989	9	3	9	4	15	9	13	51	56	55	12	16	252
1990	21	14	16	13	8	8	5	17	20	41	77	28	268
1991	73	56	94	68	63	49	24	7	24	43	96	54	651
1992	101	60	41	111	8	10	13	31	22	28	62	44	531
1993	71	24	75	15	4	14	14	20	42	35	62	36	412
1994	49	4	81	25	8	7	28	38	38	26	26	20	350
1995	41	70	20	23	31	17	16	36	44	84	65	31	478
1996	42	22	68	28	36	26	39	42	34	53	64	37	491
1997	37	22	54	14	15	10	10	25	27	38	82	13	347
1998	32	17	67	20	35	14	9	28	43	65	50	2	382
1999	23	8	43	33	22	10	13	29	39	74	36	15	345
2000	24	7	26	38	15	11	13	42	42	86	21	10	335
2001	27	43	25	20	20	10	9	41	29	104	25	11	364
2002	40	46	37	19	7	3	5	34	31	148	43	16	429
2003	58	31	13	2	4	3	7	35	22	146	30	12	363
2004	63	27	18	2	3	5	6	35	17	85	14	8	283
Average	44	28	43	27	18	13	14	32	33	67	46	22	375

Table 3-8.-Number of shellfish observer sessions by fishery for calendar year 2004.

Fishery	Number of			Totals	Percent of
	Briefings	Midtrips	Debriefings		Total Sessions
Aleutian Islands golden king crab	27	3	28	58	20.5
Bering Sea golden king crab	5	1	5	11	3.9
Bristol Bay golden king crab	1	0	1	2	0.7
Bering Sea snow crab	31	0	31	62	21.9
Bering Sea snow crab CDQ	10	0	10	20	7.1
Bristol Bay red king crab	33	1	33	67	23.7
Bristol Bay red king crab CDQ	9	1	9	19	6.7
Statewide grooved Tanner	4	3	4	11	3.9
Statewide scallops	14	5	14	33	11.7
Totals	134	14	135	283	100.0

Table 3-9.-Summary of observed vessels, observer trips, percentage of total observer trips, observer-months at sea, and percentage of total observer-months at sea by fishery in the shellfish onboard observer program, 2004.

Fishery	Observed Vessels			Observer Trips	% Total Observer Trips	Observer Months	% Total Observer Months	% Coverage		Vessel Participation
	C/P	F/P [a]	C/V [b]					C/P & F/P	C/V	
Aleutian Islands golden king crab[c]	1	0	21	27	20.5	50.7	42.9	100.0	100.0	22
Bering Sea snow crab	6	5	19	31	23.5	20.1	17.0	100.0	10.4	192
Bering Sea snow crab CDQ	1	0	9	10	7.6	11.0	9.3	100.0	100.0	10
Bering Sea golden king crab	0	0	5	5	3.8	3.4	2.9	NA	100.0	5
Bristol Bay red king crab[d]	8	4	20	33	25.0	11.9	10.1	100.0	8.2	252
Bristol Bay red king crab CDQ	2	0	6	9	6.8	4.7	4.0	100.0	60.0	12
Bristol Bay golden king crab	0	0	1	1	0.8	0.2	0.2	100.0	100.0	1
Bering Sea grooved Tanner	0	0	2	4	3.0	5.0	4.2	NA	100.0	2
Statewide scallops [e]	3	0	0	12	9.1	11.3	9.6	100.0	NA	3
Totals [f]	12	6	60	132	NA	118.3	NA	NA	NA	NA

[a] May include vessels that also operated as a C/P during the same fishery.
[b] C/Vs required to carry onboard shellfish observers.
[c] 2004/2005 fishery.
[d] Includes three AFA vessels.
[e] 2004/2005 regulatory year, excluding Cook Inlet.
[f] Vessels are unique.
NA = not applicable

Table 3-10.-Observer sampling effort and fishing effort by vessel type on observed vessels for statewide scallop and BSAI crab fisheries, 2004.

Fishery	Vessel Type	Number of Sample Pots or Tows	Number of Total Pots or Tows	Sample Rate	Number of Landings	Harvest[a]
Aleutian Islands golden king crab[b]	C/V	4,408	Confidential			
	C/P	417	Confidential			
	Total	4,825	91,694	5.3%	83	5,575,051
Bering Sea snow crab	C/V	688	11,067	6.2%	25	2,421,672
	C/P	159	3,943	4.0%	11	666,027
	Total	847	15,010	5.6%	36	3,087,699
Bering Sea snow crab CDQ	C/V	619	Confidential			
	C/P	161	Confidential			
	Total	780	13,622	5.7%	25	1,770,774
Bering Sea golden king crab	C/V	551	2,312	23.8%	Confidential	
Bristol Bay red king crab	C/V[c]	339	6,304	5.4%	22	1,042,600
	AFA C/V	67	842	8.0%	3	123,137
	C/P	130	3,370	3.9%	14	606,041
	Total	536	10,516	5.1%	39	1,771,778
Bristol Bay red king crab CDQ	C/V	143	Confidential			
	C/P	83	Confidential			
	Total	226	4,312	5.2%	16	904,244
Bristol Bay golden king crab	C/V	10	Confidential			
Bering Sea grooved Tanner	C/V	628	Confidential			
Statewide scallops[d]	C/P	1,157	4,241	27.3%	16	425,477
Totals		16,774	287,016	5.8%	432	26,769,831

[a] In pounds, deadloss included

[b] 2004/2005 fishery

[c] Non-AFA catcher vessels

[d] 2004/2005 regulatory year, excluding Cook Inlet

Table 3-11.-Aleutian Islands golden king crab observer sampling efforts for bycatch and retained catch by vessel type, 1996 – 2004.

Year	Vessel Type	Number of[a] Total Vessels	Obs. Vessels	% Obs. Coverage	Number of Observer Trips	Observer Months	Sample Pots	Pot Pulls by Vessel Type	% Sample Pot Pulls by Vessel Type	Number of Size Freq.[b]	Legal Tallies[c]
1996/1997	C/V	15	15	100.0	44	73.6	9,741	146,629	6.6	90	111
	C/P	3	3	100.0	11	16.0	1,610	32,023	5.0	239	257
	F/P	0	0	NA	0	0.0	NA	NA	NA	NA	NA
	TOTAL	18	18	100.0	55	88.6	11,351	178,652	6.4	329	368
1997/1998	C/V	11	11	100.0	41	62.0	6,871	124,073	5.5	83	94
	C/P	4	4	100.0	12	18.8	1,388	41,922	3.3	267	259
	F/P	0	0	NA	0	0.0	NA	NA	NA	NA	NA
	TOTAL	15	15	100.0	53	80.8	8,259	165,995	5.0	350	353
1998/1999	C/V	13	13	100.0	17	29.0	3,076	68,960	4.5	43	47
	C/P	3	3	100.0	7	13.0	1,293	37,584	3.4	230	233
	F/P	1	1	100.0	1	1.0	NA	NA	NA	4	4
	TOTAL	17	17	100.0	25	43.0	4,369	106,544	4.1	277	284
1999/2000	C/V	15	15	100.0	49	69.0	7,642	Confidential		97	121
	C/P	1	1	100.0	5	11.2	822	Confidential		228	230
	F/P	0	0	NA	0	0.0	NA	NA	NA	NA	NA
	TOTAL	16	16	100.0	54	80.2	8,464	186,430	4.5	325	351
2000/2001	C/V	16	16	100.0	47	63.5	9,015	Confidential		102	106
	C/P	1	1	100.0	5	9.2	742	Confidential		183	174
	F/P	0	0	NA	0	0.0	NA	NA	NA	NA	NA
	TOTAL	17	17	100.0	52	72.7	9,757	173,241	5.6	285	280

-continued-

Table 3-11.-(Page 2 of 2)

Year	Vessel Type	Number of[a] Total Vessels	Number of[a] Obs. Vessels	% Obs. Coverage	Number of Observer Trips	Number of Observer Months	Number of Sample Pots	Number of Pot Pulls by Vessel Type	% Sample Pot Pulls by Vessel Type	Number of Size Freq.[b]	Number of Legal Tallies[c]
2001/2002	C/V	20	20	100.0	44	58.7	8,344	Confidential		100	102
	C/P	1	1	100.0	4	7.7	700	Confidential		146	147
	F/P	1	1	100.0	1	0.1	NA	NA	NA	1	1
	TOTAL	21	21	100.0	49	66.5	9,044	167,544	5.4	247	250
2002/2003	C/V	21	21	100.0	31	44.3	5,834	Confidential		81	81
	C/P	1	1	100.0	2	7.0	660	Confidential		144	146
	F/P	0	0	NA	0	0.0	NA	NA	NA	NA	NA
	TOTAL	22	22	100.0	33	51.3	6,494	147,618	4.4	225	227
2003/2004	C/V	20	20	100.0	28	40.5	6,744	Confidential		73	73
	C/P	1	1	100.0	3	6.1	550	Confidential		115	115
	F/P	0	0	NA	0	0.0	NA	NA	NA	NA	NA
	TOTAL	21	21	100.0	31	46.6	7,294	125,119	5.8	188	188
2004/2005	C/V	21	21	100.0	25	45.8	4,408	Confidential		61	63
	C/P	1	1	100.0	2	4.9	417	Confidential		100	100
	F/P	0	0	NA	0	0	NA	NA	NA	NA	NA
	TOTAL	22	22	100.0	27	50.7	4,825	91,694	5.3	163.0	161

[a] Some vessels participated as both a C/P and F/P, but are counted once in the total number of vessels.

[b] Size frequency sample taken on retained catch; each data set typically consists of 100 crab.

[c] Each legal tally typically consists of 600 crab.

Table 3-12.-Bering Sea snow crab observer sampling efforts for bycatch and retained catch by vessel type, 1995 – 2004.

Year	Vessel Type	Number of [a] Total Vessels	Number of [a] Obs. Vessels	% Obs. Coverage	Number of Observer Trips	Number of Observer Months	Number of Sample Pots	Number of Pot Pulls by Obs. Vessel Type[b]	Number of Pot Pulls by Vessel Type[b]	% Sample Pot Pulls by Obs. Vessel Type[b]	% Sample Pot Pulls by Vessel Type[b]	Number of Size Freq.[c]	Number of Legal Tallies[d]
1995	C/V	234	0	0.0	NA	NA	NA	NA	-	NA	NA	NA	NA
	C/P	19	19	100.0	36	31.6	1,574	-	-	-	-	465	475
	F/P	15	15	100.0	17	22.5	NA	NA	NA	NA	NA	-	-
	TOTAL	268	34	12.7	53	54.1	1,574	-	506,802	-	0.3	465	475
1996	C/V	219	0	0.0	NA	NA	NA	NA	-	NA	NA	NA	NA
	C/P	15	15	100.0	35	31.3	1,412	-	-	-	-	479	494
	F/P	13	13	100.0	15	25.1	NA	NA	NA	NA	NA	246	292
	TOTAL	247	28	11.3	50	56.4	1,412	-	520,651	-	0.3	725	786
1997	C/V	216	0	0.0	NA	NA	NA	NA	680,725	NA	NA	NA	NA
	C/P	14	14	100.0	24	33.5	1,728	73,415	73,415	2.4	2.4	607	621
	F/P	11	11	100.0	17	26.5	NA	NA	NA	NA	NA	440	447
	TOTAL	237	25	10.5	41	60.0	1,728	73,415	754,140	2.4	0.2	1,047	1,068
1998	C/V	217	0	0.0	NA	NA	NA	NA	825,832	NA	NA	NA	NA
	C/P	12	12	100.0	21	30.7	5,872	65,436	65,436	9.0	9.0	598	609
	F/P	11	11	100.0	14	26.9	NA	NA	NA	NA	NA	751	762
	TOTAL	240	23	9.6	35	57.6	5,872	65,436	891,268	9.0	0.7	1,349	1,371
1999	C/V	231	0	0.0	NA	NA	NA	NA	846,163	NA	NA	NA	NA
	C/P	10	10	100.0	15	24.6	1,593	52,880	52,880	3.0	3.0	694	8
	F/P	11	11	100.0	12	26.3	NA	NA	NA	NA	NA	736	683
	TOTAL	252	21	8.3	27	50.9	1,593	52,880	899,043	3.0	0.2	1,430	691

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Table 3-12.-(Page 2 of 3)

Year	Vessel Type	Number of [a] Total Vessels	Number of [a] Obs. Vessels	% Obs. Coverage	Number of Observer Trips	Number of Observer Months	Number of Sample Pots	Number of Pot Pulls by Obs. Vessel Type[b]	Number of Pot Pulls by Vessel Type[b]	% Sample Pot Pulls by Obs. Vessel Type[b]	% Sample Pot Pulls by Vessel Type[b]	Number of Size Freq.[c]	Number of Legal Tallies[d]
2000	C/V	220	0	0.0	NA	NA	NA	NA	161,579	NA	NA	NA	NA
	C/P	9	9	100.0	10	5.7	202	8,485	8,485	2.4	2.4	76	60
	F/P	5	5	100.0	5	3.5	NA	NA	NA	NA	NA	111	91
	TOTAL	234	14	6.0	15	9.2	202	8,485	170,064	2.4	0.1	187	151
2001	C/V	200	7	3.5	7	9.6	241	4,663	159,438	5.2	0.2	7	6
	C/P	7	7	100.0	10	9.4	487	17,492	17,492	2.8	2.8	162	83
	F/P	3	3	100.0	3	4.3	NA	NA	NA	NA	NA	74	64
	TOTAL	210	17	8.1	20	23.3	728	22,155	176,930	3.3	0.4	243	153
2002	C/V	183	10	5.5	12	11.8	809	16,021	292,846	5.0	0.3	29	21
	C/P	8	8	100.0	9	8.0	509	14,820	14,820	3.4	3.4	170	121
	F/P	5	5	100.0	5	4.0	NA	NA	NA	NA	NA	192	105
	TOTAL	194	21	10.8	26	23.8	1,318	30,841	307,666	4.3	0.4	391	247
2003	C/V	188	18	9.6	19	14.1	741	12,813	136,280	5.8	0.5	20	20
	C/P	5	5	100.0	5	3.0	129	3,623	3,623	3.6	3.6	47	47
	F/P	5	5	100.0	6	3.5	NA	NA	NA	NA	NA	61	61
	TOTAL	196	26	13.3	30	20.6	870	16,436	139,903	5.3	0.6	128	128

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Table 3-12.-(Page 3 of 3)

Year	Vessel Type	Number of [a] Total Vessels	Number of [a] Obs. Vessels	% Obs. Coverage	Number of Observer Trips	Number of Observer Months	Number of Sample Pots	Number of Pot Pulls by Obs. Vessel Type[b]	Number of Pot Pulls by Vessel Type[b]	% Sample Pot Pulls by Obs. Vessel Type[b]	% Sample Pot Pulls by Vessel Type[b]	Number of Size Freq.[c]	Number of Legal Tallies[d]
2004	C/V	183	19	10.4	19	13.7	688	11,067	106,144	6.2	0.6	19	19
	C/P	6	6	100.0	7	3.2	159	3,943	3,943	4.0	4.0	44	44
	F/P	5	5	100.0	5	3.2	NA	NA	NA	NA	NA	58	59
	TOTAL	192	28	14.7	31	20.1	847	15,010	110,087	5.6	0.8	121	122

[a] Some vessels participated as both a C/P and F/P, but are counted once in the total number of vessels.

[b] Information is not available for 1995 - 1996.

[c] Size frequency sample taken on retained catch; each data set typically consists of 100 crab. Information is not available for 1995.

[d] Each legal tally typically consists of 600 crab. Information is not available for 1995.

Table 3-13.-Bering Sea snow crab CDQ observer sampling efforts for bycatch and retained catch by vessel type, 1998 - 2004.

Year	Vessel Type	Number of[a] Total Vessels	Number of[a] Obs. Vessels	% Obs. Coverage	Number of Observer Trips	Number of Observer Months	Number of Sample Pots	Number of Pot Pulls by Obs. Vessel Type	Number of Pot Pulls by Vessel Type	% Sample Pot Pulls by Obs. Vessel Type[b]	% Sample Pot Pulls by Vessel Type[b]	Number of Size Freq.[b]	Number of Legal Tallies[c]
1998	C/V	20	20	all vessels	25	34.0	1,726	39,333	39,333	4.4	4.4	80	82
	F/P	0	0	all F/Ps	NA	NA	NA	NA	NA	NA	NA	NA	NA
	TOTAL	20	20		25	34.0	1,726	39,333	39,333	4.4	4.4	80	82
1999	C/V	23	21	1 per group	26	10.2	789	14,131	46,490	5.6	1.7	35	27
	F/P	1	1	all F/Ps	2	1.9	NA	NA	NA	NA	NA	24	19
	TOTAL	24	22		28	12.1	789	14,131	46,490	5.6	1.7	59	46
2000	C/V	13	12	2 per group	12	8.5	629	Confidential	12,570	Confidential	5.0	32	26
	F/P	0	0	all F/Ps	NA	NA	NA	NA	NA	NA	NA	NA	NA
	TOTAL	13	12		12	8.5	629	Confidential	12,570	Confidential	5.0	32	26
2001	C/V	11	11	2 per group	11	9.9	771	14,270	14,270	5.4	5.4	33	11
	F/P	0	0	all F/Ps	NA	NA	NA	NA	NA	NA	NA	NA	NA
	TOTAL	11	11		11	9.9	771	14,270	14,270	5.4	5.4	33	11
2002	C/V	11	11	2 per group	15	16.0	1,098	Confidential	18,845	Confidential	5.8	12	10
	F/P	0	0	all F/Ps	NA	NA	NA	NA	NA	NA	NA	NA	NA
	TOTAL	11	11		15	16.0	1,098	Confidential	18,845	Confidential	5.8	12	10
2003[d]	C/V	9	8	2 per group	8	8.3	622		Confidential			21	21
	C/P	1	1	all C/Ps	2	2.1	129		Confidential			40	40
	F/P	0	0	all F/Ps	NA	NA	NA	NA	NA	NA	NA	NA	NA
	TOTAL	10	9		10	10.4	746	Confidential	14,583	Confidential	5.1	61	61

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Table 3-13.-(Page 2 of 2)

Year	Vessel Type	Number of[a] Total Vessels	Number of[a] Obs. Vessels	% Obs. Coverage	Number of Observer Trips	Number of Observer Months	Number of Sample Pots	Number of Pot Pulls by Obs. Vessel Type	Number of Pot Pulls by Vessel Type	% Sample Pot Pulls by Obs. Vessel Type[b]	% Sample Pot Pulls by Vessel Type[b]	Number of Size Freq.[b]	Number of Legal Tallies[c]
2004	C/V	9	9	2 per group	9	9.2	619		Confidential			23	17
	C/P	1	1	all C/Ps	1	1.8	161		Confidential			38	39
	F/P	0	0	all F/Ps	NA	NA	NA	NA	NA	NA	NA	NA	NA
	TOTAL	10	10		10	11.0	780	13,622	13,622	5.7	5.7	61	56

[a] Vessels may not have had observer coverage for 100% of the fishing time.

[b] Size frequency sample taken on retained catch; each data set typically consists of 100 crab.

[c] Each legal tally typically consists of 600 crab.

[d] 2003 was the first year a C/P participated in the fishery.

Table 3-14.-Bering Sea golden king crab observer sampling efforts for bycatch and retained catch by vessel type in 1989, 1992, 2001 - 2004.

Year	Vessel Type	Number of Total Vessels	Number of Obs. Vessels	% Obs. Coverage	Number of Observer Trips	Number of Observer Months	Number of Sample Pots[a]	Number of Pot Pulls by Vessel Type[a]	% Sample Pot Pulls by Vessel Type[a]	Number of Size Freq.[a,b]	Number of Legal Tallies[a,c]
1989	C/V	0	0	100.0	0	0.0	NA	NA	NA	NA	NA
	C/P	2	2	100.0	2	1.5	-	-	-	-	-
	TOTAL	2	2	100.0	2	1.5	-	-	-	-	-
1992	C/V	0	0	100.0	0	0.0	NA	NA	NA	NA	NA
	C/P	2	2	100.0	2	1.3	-	-	-	-	-
	TOTAL	2	2	100.0	0	1.3	-	-	-	-	-
2001	C/V	6	6	100.0	9	10.5	1,356	4,513	30.0	13	14
	C/P	0	0	100.0	0	0.0	NA	NA	NA	NA	NA
	TOTAL	6	6	100.0	9	10.5	1,356	4,513	30.0	13	14
2002	C/V	8	8	100.0	11	11.4	1,505	5,464	27.5	9	10
	C/P	0	0	100.0	0	0.0	NA	NA	NA	NA	NA
	TOTAL	8	8	100.0	11	11.4	1,505	5,464	27.5	9	10
2003	C/V	3	3	100.0	3	4.6	593	Confidential		6	6
	C/P	0	0	100.0	0	0	NA	NA	NA	NA	NA
	TOTAL	3	3	100.0	3	4.6	593	Confidential		6	6
2004	C/V	5	5	100.0	5	3.4	551	2,312	23.8	7	7
	C/P	0	0	100.0	0	0	NA	NA	NA	NA	NA
	TOTAL	5	5	100.0	5	3.4	551	2,312	23.8	7	7

[a] Information is not available for 1989 and 1992.

[b] Size frequency sample taken on retained catch; each data set typically consists of 100 crab.

[c] Each legal tally typically consists of 600 crab.

Table 3-15.-Bristol Bay red king crab observer sampling efforts for bycatch and retained catch by vessel type, 1988 – 2004.

Year	Vessel Type	Number of[a] Total Vessels	Number of[a] Obs. Vessels	% Obs. Coverage	Number of Observer Trips	Number of Observer Months	Number of Sample Pots	Number of Pot Pulls by Obs. Vessel Type[b]	Number of Pot Pulls by Vessel Type[b]	% Sample Pot Pulls by Obs. Vessel Type[b]	% Sample Pot Pulls by Vessel Type[b]	Number of Size Freq.[c]	Number of Legal Tallies[b,d]
1988	C/V	180	0	0.0	0	0	NA	NA	-	NA	NA	NA	NA
	C/P	20	20	100.0	20	8.4	31	-	-	-	-	0	-
	F/P	5	5	100.0	5	1.9	NA	NA	NA	NA	NA	0	-
	TOTAL	205	25	12.2	25	10.3	31	-	153,004	-	<.1	0	-
1989	C/V	193	0	0.0	0	0	NA	NA	-	NA	NA	NA	NA
	C/P	18	18	100.0	18	10.9	94	-	-	-	-	110	-
	F/P	12	12	100.0	12	6.8	NA	NA	NA	NA	NA	101	-
	TOTAL	223	30	13.5	30	17.6	94	-	208,684	-	<.1	211	-
1990	C/V	220	0	0.0	0	0	NA	NA	-	NA	NA	NA	NA
	C/P	20	20	100.0	20	11.9	140	-	-	-	-	-	-
	F/P	15	15	100.0	15	8.9	NA	NA	NA	NA	NA	-	-
	TOTAL	255	35	13.7	35	20.8	140	-	262,131	-	0.1	-	-
1991	C/V	277	0	0.0	0	0	NA	NA	-	NA	NA	NA	NA
	C/P	25	25	100.0	26	14.2	272	-	-	-	-	163	-
	F/P	14	14	100.0	14	7.4	NA	NA	NA	NA	NA	130	-
	TOTAL	316	39	12.3	40	21.5	272	-	227,555	-	0.1	293	-
1992	C/V	263	0	0.0	0	0	NA	NA	-	NA	NA	NA	NA
	C/P	18	18	100.0	19	9.0	290	-	-	-	-	99	-
	F/P	6	6	100.0	6	3.0	NA	NA	NA	NA	NA	80	-
	TOTAL	287	24	8.4	25	12.0	290	-	205,940	-	0.1	179	-

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Year	Vessel Type	Number of[a] Total Vessels	Obs. Vessels	% Obs. Coverage	Number of Observer Trips	Observer Months	Sample Pots	Pot Pulls by Obs. Vessel Type[b]	Pot Pulls by Vessel Type[b]	% Sample Pot Pulls by Obs. Vessel Type[b]	% Sample Pot Pulls by Vessel Type[b]	Number of Size Freq.[c]	Legal Tallies[b,d]
1993	C/V	275	0	0.0	0	0	NA	NA	-	NA	NA	NA	NA
	C/P	17	17	100.0	19	10.6	558	-	-	-	-	124	-
	F/P	7	7	100.0	7	4.5	NA	NA	NA	NA	NA	112	-
	TOTAL	299	24	8.0	26	15.1	558	-	253,794	-	0.2	236	-
1994						NO COMMERCIAL FISHERY							
1995						NO COMMERCIAL FISHERY							
1996	C/V	192	0	0.0	0	0	0	NA	73,908	NA	NA	NA	NA
	C/P	4	4	100.0	7	2.0	84	2,525	2,525	3.3	3.3	19	19
	F/P	2	2	100.0	2	0.8	NA	NA	NA	NA	NA	26	62
	TOTAL	197	5	2.5	9	2.8	84	2,525	76,433	3.3	0.1	45	81
1997	C/V	248	0	0.0	0	0	0	NA	86,968	NA	NA	NA	NA
	C/P	8	8	100.0	12	3.9	146	3,542	3,542	4.1	4.1	28	28
	F/P	3	3	100.0	3	1.6	NA	NA	NA	NA	NA	52	56
	TOTAL	259	11	4.2	15	5.5	146	3,542	90,510	4.1	0.2	80	84
1998	C/V	263	0	0.0	0	0	0	NA	135,093	NA	NA	NA	NA
	C/P	11	11	100.0	19	6.7	131	6,614	6,614	2.0	2.0	48	52
	F/P	5	5	100.0	3	1.8	NA	NA	NA	NA	NA	37	52
	TOTAL	277	14	5.1	22	8.5	131	6,614	141,707	2.0	0.1	85	104
1999	C/V	249	0	0.0	0	0	0	NA	141,298	NA	NA	NA	NA
	C/P	8	8	100.0	10	4.6	135	5,699	5,699	2.4	2.4	46	56
	F/P	3	3	100.0	1	1.0	NA	NA	NA	NA	NA	22	26
	TOTAL	258	9	3.5	11	5.6	135	5,699	146,997	2.4	0.1	68	82

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Table 3-15.-(Page 3 of 4)

Year	Vessel Type	Number of[a] Total Vessels	Number of[a] Obs. Vessels	% Obs. Coverage	Number of Observer Trips	Number of Observer Months	Number of Sample Pots	Number of Pot Pulls by Obs. Vessel Type[b]	Number of Pot Pulls by Vessel Type[b]	% Sample Pot Pulls by Obs. Vessel Type[b]	% Sample Pot Pulls by Vessel Type[b]	Number of Size Freq.[c]	Number of Legal Tallies[b,d]
2000	C/V[e]	214	11	5.1	11	5.1	403	4,429	86,313	9.1	0.5	10	11
	AFA C/V	25	3	12.0	3	1.1	88	1,024	8,340	8.6	1.1	3	3
	C/P	7	7	100.0	9	3.4	156	4,041	4,041	3.9	3.9	28	29
	F/P	2	2	100.0	3	0.6	NA	NA	NA	NA	NA	14	17
	TOTAL	247	22	8.9	26	10.2	647	9,494	98,694	6.8	0.7	55	60
2001	C/V[e]	193	20	10.4	20	9.5	359	5,746	54,804	6.2	0.7	19	19
	AFA C/V	31	3	9.7	3	1.0	48	682	6,662	7.0	0.7	3	3
	C/P	6	6	100.0	7	2.3	97	1,776	1,776	5.5	5.5	13	13
	F/P	3	3	100.0	3	1.2	NA	NA	NA	NA	NA	19	19
	TOTAL	231	30	13.0	33	14.0	504	8,204	63,242	6.1	0.8	54	54
2002	C/V[e]	204	17	8.3	17	7.1	330	5,236	55,496	6.3	0.6	16	18
	AFA C/V	31	3	9.7	3	1.3	37	551	5,776	6.7	0.6	3	3
	C/P	7	7	100.0	8	2.3	144	2,556	2,556	5.6	5.6	21	21
	F/P	3	3	100.0	3	1.0	NA	NA	NA	NA	NA	9	9
	TOTAL	243	28	11.5	31	11.8	511	8,343	63,828	6.1	0.8	49	51
2003	C/V[e]	210	19	9.0	20	10.0	485	10,531	111,120	4.6	0.4	11	11
	AFA C/V	32	3	9.0	3	1.2	71	911	12,913	7.8	0.5	1	1
	C/P	8	8	100.0	10	3.6	175	4,986	4,986	3.5	3.5	35	32
	F/P	4	4	100.0	4	1.6	NA	NA	NA	NA	NA	16	18
	TOTAL	251	31	13.0	37	16.4	731	16,428	129,019	4.4	0.6	63	62

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Table 3-15.-(Page 4 of 4)

Year	Vessel Type	Number of[a] Total Vessels	Number of[a] Obs. Vessels	% Obs. Coverage	Number of Observer Trips	Number of Observer Months	Number of Sample Pots	Number of Pot Pulls by Obs. Vessel Type[b]	Number of Pot Pulls by Vessel Type[b]	% Sample Pot Pulls by Obs. Vessel Type[b]	% Sample Pot Pulls by Vessel Type[b]	Number of Size Freq.[c]	Number of Legal Tallies[b,d]
2004	C/V[e]	211	17	8.0	17	6.6	339	6,304	79,509	5.4	0.4	16	16
	AFA C/V	32	3	9.0	3	1.1	67	842	8,093	8.0	0.8	3	3
	C/P	8	8	100.0	9	2.8	130	3,370	3,370	3.9	3.9	17	17
	F/P	4	4	100.0	4	1.4	NA	NA	NA	NA	NA	31	33
	TOTAL	252	29	12.0	33	11.9	536	10,516	90,972	5.1	0.6	67	69

[a] Some vessels participated as both a C/P and F/P and are only counted once in the total number of vessels.

[b] Information is not available for 1988-1993.

[c] Size frequency sample taken on retained catch; each data set typically consists of 100 crab. Information is not available for 1990.

[d] Each legal tally typically consists of 600 crab.

[e] Non-AFA catcher vessels.

Table 3-16.-Bristol Bay red king crab CDQ observer sampling efforts for bycatch and retained catch by vessel type, 1998 - 2004.

		Number of			Number of					% Sample	% Sample	Number of	
Year	Vessel Type	Total Vessels	Obs. Vessels	% Obs. Coverage	Observer Trips	Observer Months	Sample Pots	Pot Pulls by Obs. Vessel Type	Pot Pulls by Vessel Type	Pot Pulls by Obs. Vessel Type[b]	Pot Pulls by Vessel Type[b]	Size Freq.[a]	Legal Tallies[b]
1998	C/V	7	7	all vessels	7	3.1	193	3,405	3,405	5.7	5.7	9	10
1999	C/V	10	10	all vessels	10	3.5	263	2,976	2,976	8.8	8.8	9	12
2000	C/V	11	11	all vessels	11	4.4	423	4,663	4,663	9.1	9.1	1	0
2001	C/V	10	6	1 per group	6	2.9	166	2,516	3,158	6.6	5.3	9	9
2002	C/V	10	6	1 per group	6	2.7	242	2,875	3,909	8.4	6.2	9	9
2003[c]	C/V	11	6	1 per group	7	2.8	184		Confidential			8	8
	C/P	2	2	all vessels	2	0.9	95		Confidential			14	4
	TOTAL	13	8		9	3.7	279	4,372	5,704	6.4	4.9	22	12
2004	C/V	10	6	1 per group	7	3.5	143		Confidential			11	11
	C/P	2	2	all vessels	2	1.2	83		Confidential			12	12
	TOTAL	12	8		9	4.7	226	4,312	5,359	5.2	4.2	23	23

[a] Size frequency sample taken on retained catch; each data set typically consists of 100 crab.

[b] Each legal tally typically consists of 600 crab.

[c] 2003 was the first year C/Ps fished Bristol Bay CDQ red king crab.

Table 3-17.-Statewide grooved Tanner crab observer sampling efforts for bycatch and retained catch by vessel type, 1994 – 2004.

Year	Vessel Type	Number of Total Vessels	Number of Obs. Vessels	% Obs. Coverage	Number of Observer Trips	Number of Observer Months	Number of Sample Pots	Number of Pot Pulls by Vessel Type	% Sample Pot Pulls by Vessel Type	Number of Size Freq.[a]	Number of Legal Tallies[b]
1994	C/V	6	6	100.0	14	16.6	1782	Confidential		58	30
	C/P	2	2	100.0	3	2.3	336	Confidential		46.0	45.0
	TOTAL	8	8	100.0	17	18.8	2118	55,433	3.8	104	75
1995	C/V	16	16	100.0	47	55.2	10343	Confidential		155	145
	C/P	2	2	100.0	8	6.2	620	Confidential		66.0	85.0
	TOTAL	18	18	100.0	55	61.3	10963	163,462	6.7	221	230
1996	C/V	9	9	100.0	20	26.3	4469	73,960	6.0	40	62
	C/P	0	0	100.0	0	0.0	NA	NA	NA	NA	NA
	TOTAL	9	9	100.0	20	26.3	4469	73,960	6.0	40	62
1997	No vessels participated in the fishery										
1998	No vessels participated in the fishery										
1999	No vessels participated in the fishery										
2000	C/V	1	1	100.0	1	1.4	164	Confidential		3.0	3.0
	C/P	2	2	100.0	2	0.7	17	Confidential		5	0
	TOTAL	3	3	100.0	3	2.0	181	Confidential		8	3
2001	C/V	2	2	100.0	4	2.7	258	Confidential		15	15
	C/P	0	0	100.0	0	0.0	NA	NA	NA	NA	NA
	TOTAL	2	2	100.0	4	2.7	258	Confidential		15	15
2002	No vessels participated in the fishery										

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Year	Vessel Type	Number of Total Vessels	Number of Obs. Vessels	% Obs. Coverage	Number of Observer Trips	Number of Observer Months	Number of Sample Pots	Number of Pot Pulls by Vessel Type	% Sample Pot Pulls by Vessel Type	Number of Size Freq.[a]	Number of Legal Tallies[b]
2003	C/V	1	1	100.0	2	3.2	393	Confidential		11	10
	C/P	0	0	100.0	0.0	0.0	NA	NA	NA	NA	NA
	TOTAL	1	1	100.0	2	3.2	393	Confidential		11	10
2004	C/V	2	2	100.0	4	5.0	628	Confidential		18	14
	C/P	0	0	100.0	0.0	0.0	NA	NA	NA	NA	NA
	TOTAL	2	2	100.0	4	5.0	628	Confidential		18	14

[a] Size frequency sample taken on retained catch; each data set typically consists of 100 crab.

[b] Each legal tally typically consists of 600 crab.

Table 3-18.-Yearly summary by region of observed scallop vessels, number of observer trips, and observer-months at sea for Alaska weathervane scallop fisheries from 1993 – 2004/05, excluding Cook Inlet.

Year	Yakutat[a]			Prince William Sound			Westward[c]			Total		
	Vessel[b]	Trips	Months	Vessel[b]	Trips	Months	Vessel[b]	Trips	Months	Vessel[b]	Trips	Months
1993	7	8	4.1	7	7	2.3	11	62	35.0	10	77	41.4
1994/1995	10	15	6.8	0	0	0.0	12	50	35.2	12	65	42.0
1995/1996	8	9	8.1	2	2	1.0	1	4	2.4	8	15	11.5
1996/1997	4	7	5.7	0	0	0.0	5	12	11.7	5	19	17.4
1997/1998	4	4	4.2	1	1	0.4	6	20	17.0	6	25	21.6
1998/1999	8	10	7.7	2	2	0.7	8	28	18.0	8	40	26.5
1999/2000	3	4	6.1	2	2	0.5	7	21	15.1	8	27	21.7
2000/2001	3	10	8.4	3	3	1.4	6	14	10.4	7	27	20.2
2001/2002	2	4	3.8	1	2	1.0	4	11	9.9	4	17	14.7
2002/2003	2	2	3.9	2	2	0.9	3	13	10.0	4	17	14.8
2003/2004	2	3	4.3	1	2	0.7	2	8	7.9	2	13	12.9
2004/2005	2	4	3.8	3	3	1.6	2	5	5.9	3	12	11.3
Average	5	7	5.6	2	2	0.9	6	21	14.9	6	30	21.3

[a] Includes District 16.
[b] Number of unique vessels.
[c] Includes Kodiak, Alaska Peninsula, Dutch Harbor, Adak and Bering Sea Registration Area.

Table 3-19.-Scallop observer activity by area for the 2004/2005 regulatory season.

Area	Number of Vessels[a]	Observer Trips		Observer Months	Percent of Total Observer Months
		Number	Percent		
Yakutat	2	4	33.3	3.8	33.6
Prince William Sound	3	3	25.0	1.6	14.2
Kodiak	2	4	33.3	5.5	48.7
Bering Sea	1	1	8.3	0.4	3.5
Alaska Peninsula	0	0	0.0	0.0	0.0
Adak	0	0	0.0	0.0	0.0

[a] Number of unique vessels.
NA = not applicable

Table 3-20.-Summary of evidence collected by shellfish observers during fisheries in which observers were deployed.

Fishery	Year	Observer Trips	Trips with Evidence	Percent of Observed Trips[a]	Percent of Year's Evidence[b]
St. Matthew / Pribilof red and blue king crab	1991	11	0	0.0	0.0
	1992	16	1	6.3	2.4
	1993	11	1	9.1	5.6
	1994	11	1	9.1	5.9
	1995	7	1	14.3	4.0
	1996	7	4	57.1	16.7
	1997	4	0	0.0	0.0
	1998	8	1	12.5	3.0
Dutch Harbor area golden king crab	1991	4	1	25.0	2.4
	1992	6	1	16.7	2.4
	1993	2	0	0.0	0.0
	1994	2	1	50.0	5.9
	1995	19	0	0.0	0.0
Adak area red and golden king crab	1991	23	3	13.0	7.1
	1992	12	5	41.7	11.9
	1993	5	1	20.0	5.6
	1994	12	2	16.7	11.8
	1995	60	5	8.3	20.0
Adak area red king crab only	1991	2	0	0.0	0.0
	1992	2	0	0.0	0.0
	1993	1	0	0.0	0.0
	1994	4	1	25.0	5.9
	2001	6	0	0.0	0.0
	2002	46	0	0.0	0.0
	2003	31	0	0.0	0.0
Aleutian Islands golden king crab [c]	1996	34	12	35.3	50.0
	1997	53	15	28.3	57.7
	1998	25	3	12.0	9.1
	1999	54	3	5.6	25.0
	2000	52	2	3.8	40.0
	2001	49	5	10.2	71.4
	2002	33	0	0.0	0.0
	2003	31	0	0.0	0.0
	2004	27	1	3.7	0.3

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Fishery	Year	Observer Trips	Trips with Evidence	Percent of Observed Trips[a]	Percent of Year's Evidence[b]
Bristol Bay red king crab	1996	9	0	0.0	0.0
	1997	15	3	20.0	11.5
	1998	24	3	12.5	9.1
	1999	15	3	20.0	25.0
	2000	26	1	3.8	20.0
	2001	33	2	6.1	28.6
	2002	33	0	0.0	0.0
	2003	37	3	8.1	42.9
	2004	33	1	3.0	0.3
Bering Sea snow crab	1991	151	18	11.9	42.9
	1992	107	19	17.8	45.2
	1993	63	8	12.7	44.4
	1994	55	8	14.5	47.1
	1995	53	14	26.4	56.0
	1996	50	3	6.0	12.5
	1997	41	4	9.8	15.4
	1998	35	11	31.4	33.3
	1999	27	5	18.5	41.7
	2000	15	0	0.0	0.0
	2001	20	0	0.0	0.0
	2002	26	3	11.5	100.0
	2003	30	3	10.0	42.9
	2004	31	1	3.2	0.3
Bering Sea Tanner crab	1991	52	12	23.1	28.6
	1992	42	8	19.0	19.0
	1993	22	5	22.7	27.8
	1994	10	2	20.0	11.8
	1995	12	2	16.7	8.0
	1996	3	0	0.0	0.0
Bering Sea hair crab	1992	10	0	0.0	0.0
	1993	27	0	0.0	0.0
	1994	12	1	8.3	5.9
	1995	22	0	0.0	0.0

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Fishery	Year	Observer Trips	Trips with Evidence	Percent of Observed Trips[a]	Percent of Year's Evidence[b]
	1996	21	3	14.3	12.5
	1997	16	4	25.0	15.4
Bering Sea hair crab	1998	12	2	16.7	6.1
	1999	8	0	0.0	0.0
	2000	3	0	0.0	0.0
	1994	14	1	7.1	5.9
Grooved Tanner crab	1995	57	1	1.8	4.0
All areas[d]	1996	20	2	10.0	8.3
	2000	3	0	0.0	0.0
	2001	4	0	0.0	0.0
	2003	2	0	0.0	0.0
	2004	4	0	0.0	0.0
	1992	8	0	0.0	0.0
	1993	8	0	0.0	0.0
	1994	0	0	0.0	0.0
	1995	15	2	13.3	8.0
Miscellaneous	1996	1	0	0.0	0.0
Fisheries[e]	1997	4	0	0.0	0.0
	1998	0	0	0.0	0.0
	1999	0	0	0.0	0.0
	2000	1	0	0.0	0.0
	2001	10	0	0.0	0.0
	2002	12	0	0.0	0.0
	2003	3	0	0.0	0.0
	2004	6	0	0.0	0.0
	1998	35	13	37.1	39.4
Community Development	1999	38	1	2.6	8.3
Quota fisheries[f]	2000	23	2	8.7	40.0
	2001	17	0	0.0	0.0
	2002	21	0	0.0	0.0
	2003	19	1	5.3	14.3
	2004	19	1	5.3	0.3

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Fishery	Year	Observer Trips	Trips with Evidence	Percent of Observed Trips[a]	Percent of Year's Evidence[b]
	2001	15	0	0.0	0.0
Statewide scallops	2002	17	0	0.0	0.0
	2003	13	0	0.0	0.0
	2004	12	0	0.0	0.0
	1991	283	34	12.0	
	1992	228	34	14.9	
	1993	165	15	9.1	
	1994	120	17	14.2	
Summary	1995	245	25	10.2	
	1996	145	24	16.6	
	1997	133	26	19.5	NA
	1998	139	33	23.7	
	1999	142	12	8.5	
	2000	123	5	4.1	
	2001	154	7	4.5	
	2002	199	3	1.5	
	2003	166	7	4.2	
	2004	132	4	3.0	

[a] Percentage of trips in which evidence was collected.

[b] Percentage of total evidence collected by fishery for the fishing season.

[c] In 1996 the Adak and Dutch Harbor king crab Registration Areas were consolidated into the Aleutian Islands Area ‘O’ king crab Registration Area and opened on September 1st, the traditional opening time of the former Dutch Harbor area.

[d] Grooved Tanner crab areas include the Bering Sea, Aleutian Islands, Kodiak, Alaska Peninsula, and Southeastern Alaska.

[e] Miscellaneous fisheries for all years can include: Bering Sea golden king crab, BSAI octopus, surf clam, snail, St. Lawrence blue king crab, Norton Sound red king crab, eastern Aleutian triangle Tanner crab, western Aleutian Tanner and hair crab, Southeast Alaska misc. (urchins, shrimp, etc.).

[f] CDQ fisheries include Bering Sea snow crab, St. Matthew blue king crab, Pribilof red and blue king crab, and Bristol Bay red king crab.

NA = not applicable

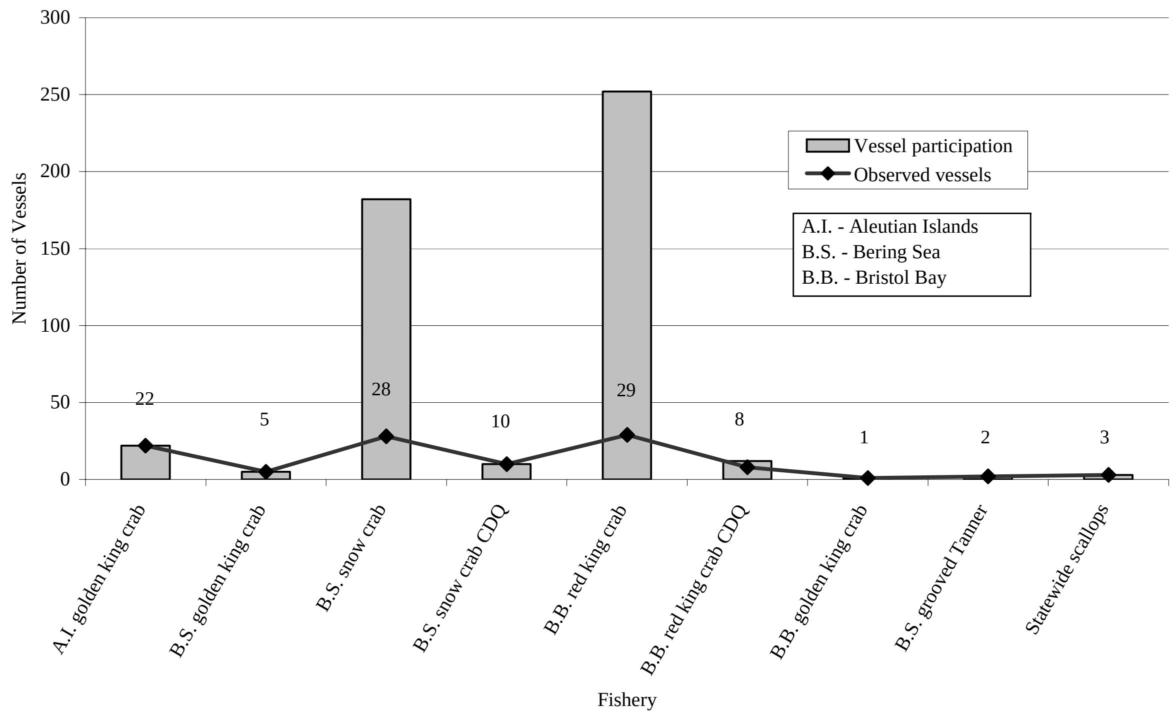

Figure 3-1.-Level of observer coverage by fishery in 2004.

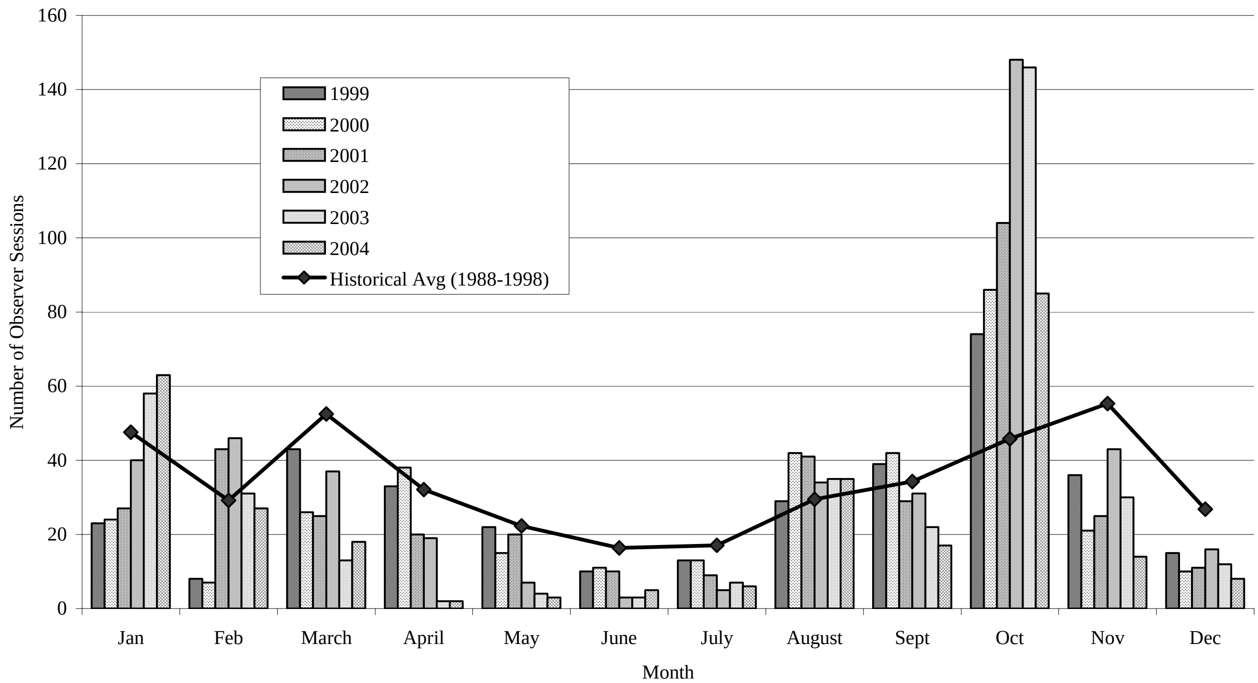

Figure 3-2.-Comparison of the total number of crab and scallop observer sessions, including briefings, midtrips and debriefings for calendar year 1999, 2000, 2001, 2002, 2003 and 2004, and the historical average (1988 - 1998).

Economic Summary of BSAI Crab Fisheries

Prepared by J. Greenberg

The 2004 seasons marked the end of the open era in the Alaska crab fisheries and the beginning of management through rationalization. The committee notes that in the era of rationalization the interplay between industry behavior, fishery management and fishery health will strengthen and become of increased importance. The committee recognizes a need to become more familiar with the economic performance of the industry and industry behavior so it can better understand potential effects to industry of its recommendations and how industry changes may facilitate fishery management. In the past two SAFE Reports the committee has made specific mention of its regret as to the absence of more detailed economic data for the Alaska crab fisheries. This will change in 2005, as the Economic Data Collection Program is implemented. Under this program, it is mandatory for fishery participants to provide detailed data about their operations to NMFS.

> A mandatory data collection program shall be developed and implemented as part of the crab rationalization program and continued through the life of the program. Cost, revenue, ownership and employment data will be collected on a periodic basis (based on scientific requirements) to provide the information necessary to study the impacts of the crab rationalization program as well as collecting data that could be used to analyze the economic and social impacts of future FMP amendments on industry, regions, and localities. This data collection effort is also required to fulfill the Council problem statement requiring a crab rationalization program that would achieve "equity between the harvesting and processing sectors" and to monitor the "…economic stability for harvesters, processors and coastal communities". Both statutory and regulatory language shall be developed to ensure the confidentiality of these data. (Final EIS for the BSAI King and Tanner Crab Fisheries, Appendix-1 RIR, 2004, pg. 498)

It is the committee intentions to become more familiar with the types of data that will be available, determine how it may best incorporate this new information within our scope of activities and explore what types of analysis may be useful. However, at this point in time the description of the Alaska crab fisheries presented here is limited to updated fishery-wide data on production and revenues that have been included in the ADFG Westward Annual Management Reports for the BSAI shellfish fisheries.

The committee however, is interested in presenting in this SAFE report a more detailed economic analysis regarding Alaska crab fisheries. In this interest, a research summary of an international crab market model is presented following the presentation of fishery-wide date in Figure 1. This analysis was prepared by Drs. Greenberg and Herrmann and funded by the North Pacific Research Board. A market model has been completed that investigates the relationship between snow crab allocation from its two major suppliers, Alaska and Canada, to its two major markets, Japan and the United States. The model also examines the relationship between wholesale prices and exvessel prices in Alaska and Canada. The model is currently being expanded to incorporate Alaska king crab and model modifications will occur. Nevertheless, it is instructive to understand how economic analysis may assist fishery management. For example the presented models can be used to explore how various snow crab fishery TACs may affect exvessel revenue under various levels of assumed Canadian landings.

Table 1. Historic fishery performance data for 5 key BSAI crab fisheries, 1990-2002 or most recent opened season. (Source: Annual Management Report for the Commercial and Subsistence Shellfish Fisheries of the Aleutian Islands and Bering Sea and the Westward Region's Shellfish Observer Program, Various Years..

Fishery	Season	Vessels	Season length*	Harvest (m.lbs.)	Exvessel Price ($/lb)	CPUE	Value ($m.)	Value Per Vessel ($,000)*
Bristol Bay Red King Crab	1990	240	12	20.36	5	1	101.2	421.67
	1991	302	7	17.18	3	12	51.2	69.54
	1992	281	7	8.04	5	6	40.2	143.06
	1993	292	9	14.63	3.8	9	55.1	188.70
	1994			CLOSED				
	1995			CLOSED				
	1996	196	4	8.41	4.01	16	33.6	171.43
	1997	256	4	8.76	3.26	15	28.5	111.33
	1998	274	5	14.23	2.64	15	37.4	136.50
	1999	257	5	11.09	6.26	12	69.1	268.87
	2000	246	4	7.55	4.81	12	36	146.34
	2001	230	3.3	7.79	4.81	19	37.5	163.04
	2002	242	2.8	8.86	6.14	20	54.2	223.97
	2003	252	5.1	14.53	5.08	18	72.7	288.49
Bering Sea Snow Crab	1990	189	148	161.82	0.64	141	102.3	541.27
	1991	220	159	328.65	0.5	191	162.6	739.09
	1992	250	97	315.30	0.5	177	156.5	626.00
	1993	254	59	230.79	0.75	175	171.9	676.77
	1994	273	45	149.78	1.3	160	192.4	704.76
	1995	253	33	75.25	2.43	117	180	711.46
	1996	234	45	65.71	1.33	102	85.6	365.81
	1997	226	65	119.54	0.79	133	92.6	409.73
	1998	229	64	243.34	0.56	207	134.65	587.99
	1999	241	66	184.53	0.88	158	160.78	667.14
	2000	229	7	30.77	1.81	137	55.09	240.57
	2001	207	30	23.38	1.53	97	32.12	155.17
	2002	191	24	30.25	1.49	76	44.2	231.41
	2003	192	9	26.34	1.83	155	46.98	244.69

Bering Sea Tanner Crab	1990	179	89	711.14	1.85	15	45.3	253.07
	1990/91	255	126	883.39	1.12	19	44.5	174.51
	1991/92	285	137	1244.63	1.5	10	47.3	165.96
	1992/93	294	137	1200.89	1.69	13	58.8	200.00
	1993/94	296	52	576.46	1.9	13	31.6	106.76
	1994	183	20	249.54	3.75	13	28.5	155.74
	1995	196	15	247.85	2.8	8	11.7	59.69
	1996	196	16	149.29	2.49	5	4.5	22.96

Fishery	Season	Vessels	Season length*	Harvest (m.lbs.)	Exvessel Price ($/lb)	CPUE	Value ($m.)	Value Per Vessel ($,000)*
Aleutian Golden	1990/91	24	288	6.97	3	8	20.25	Na
	1991/92	20	289	7.70	2.41	8	18.2	Na
	1992/93	22	288	6.29	2.15	8	13.16	Na
	1993/94	21	288	5.55	2.44	6	13.13	Na
	1994/95	35	288	8.13	3.48	5	27.21	Na
	1995/96	28	289	6.89	2.25	5	14.72	Na
	1996/97	18	365	5.85	2.23	6	12.53	Na
	1997/98	15	365	5.95	2.19	7	12.54	Na
	1998/99	16	365	4.94	1.92	10	9.33	Na
	1999/00	17	348	5.84	3.15	8	18.01	Na
	2000/01	17	286	6.02	3.33	8	19.52	Na
	2001/02	21	227	5.89	3.16	8	18.13	Na
	2002/03	22	205	5.46	3.38	9	18.26	Na
	2003/04	21	205	5.67	3.61	11	20.16	Na
St. Mathew Blue Crab	1990	31	6	1.73	3.35	15	5.70	183.87
	1991	68	4	3.37	2.80	20	9.00	132.35
	1992	174	3	2.47	3.00	10	7.40	42.53
	1993	92	6	3.00	3.23	11	9.70	105.43
	1994	87	7	3.76	4.00	14	15.00	172.41
	1995	90	5	3.17	2.32	14	7.10	78.89
	1996	122	8	3.08	2.20	7	6.70	54.92
	1997	117	7	4.65	2.21	12	9.80	83.76
	1998	131	11	2.87	1.87	7	5.34	40.76

* Aluetian Golden king crab fishery values per vessel not reported because of separate fisheries for East and West of 172° West

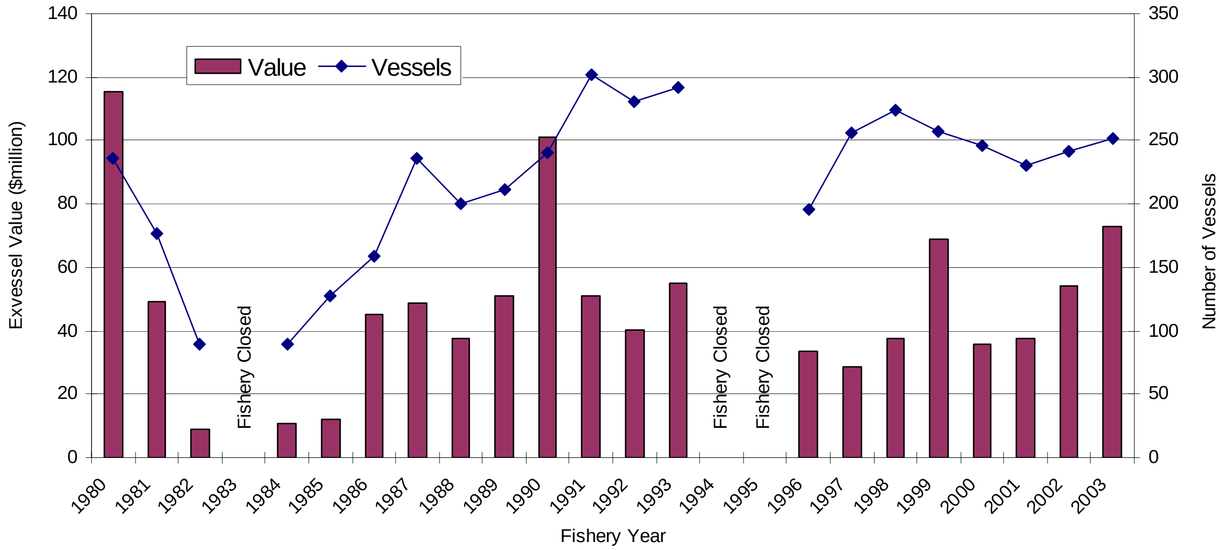

Figure 1. Bristol Bay red king crab effort and exvessel value, 1980-2003.

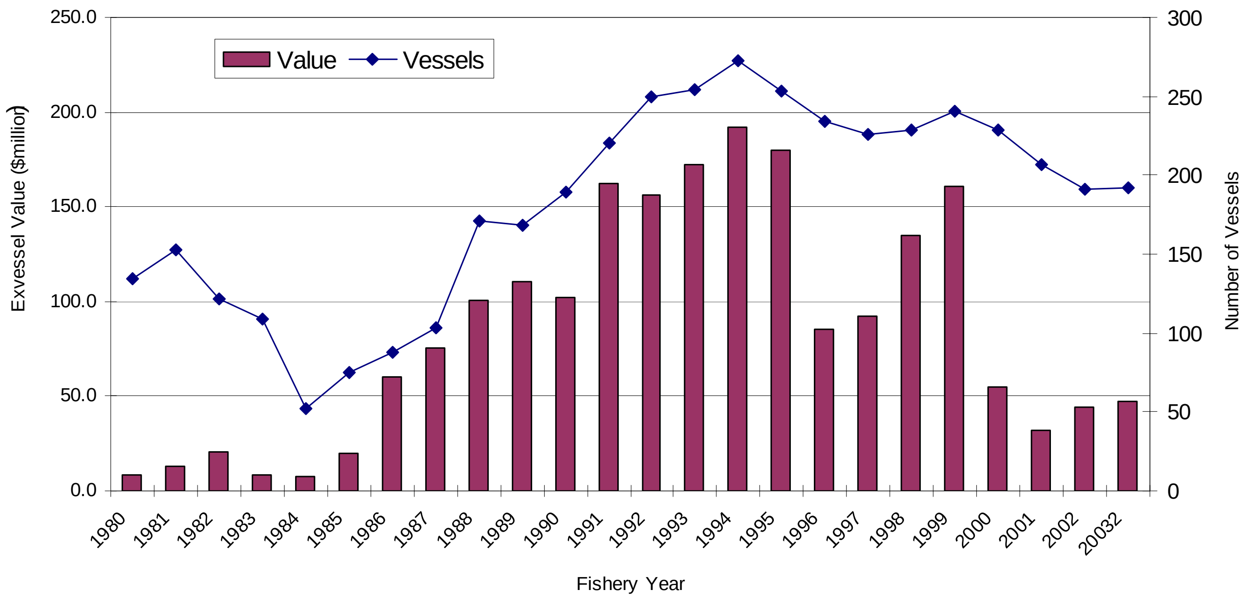

Figure 2.Bering Sea snow crabeffort and exvessel value, 1980-2003.

Alaska Crab Market Models.

September 9, 2005.

Dr. Joshua Greenberg and Dr. Mark Herrmann
Department of Resources Management and Department of Economics, University of Alaska Fairbanks.
Contact: j.greenberg@uaf.edu

This report is prepared for the North Pacific Fishery Management Council to be included in the Crab Plan Team Safe Report. This study was funded by funds received from the North Pacific Research Board (NPRB) for project #423. All findings and opinions therein are the authors.

EXECUTIVE SUMMARY

The decline of the Bering Sea snow crab fishery harvests began in 2000 when harvests declined to just 30.8 million pounds (down from a high of 328.6 million pounds in 1991 and from a 1999 harvest of 182.7 million pounds). Further complicating the economic health of the Alaska snow crab industry are increases in snow crab harvests from eastern Canada. Canadian harvests of snow crab (also referred to as Queen crab) steadily increased from 21.6 million pounds in 1973 to 235.5 million pounds in 2002. The 2004 landings of 227.4 million pounds of Canadian snow crab are nearly ten times that of the landings of Alaska snow crab (figure 3).

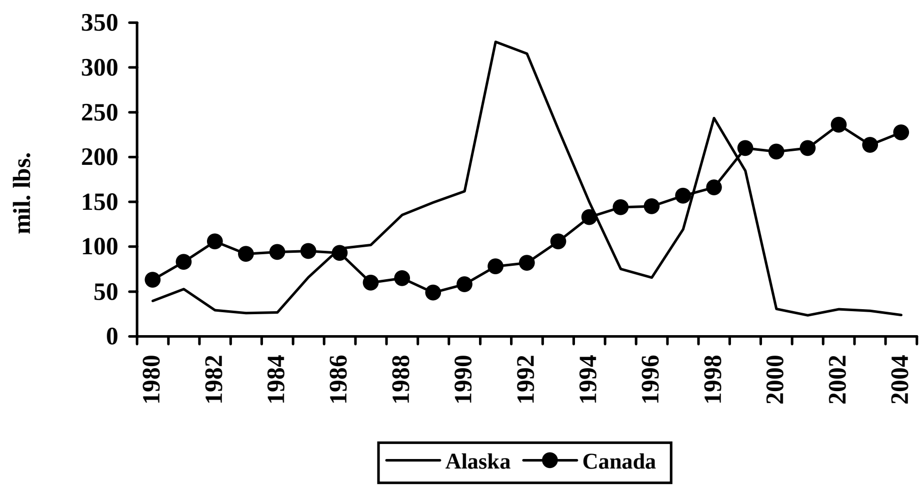

Figure 3. Alaska and Canada landings of snow (Queen) crab landings from 1980 to 2004 (millions of pounds).

Alaska snow crab exvessel revenues decreased from US$194 million in 1994 to $58 million in 2000 and were $49 million in 2004 (figure 4). Meanwhile, Canadian exvessel revenue has increased from $14 million in 1980 to $478 million in 2004, again nearly ten times that of Alaska.

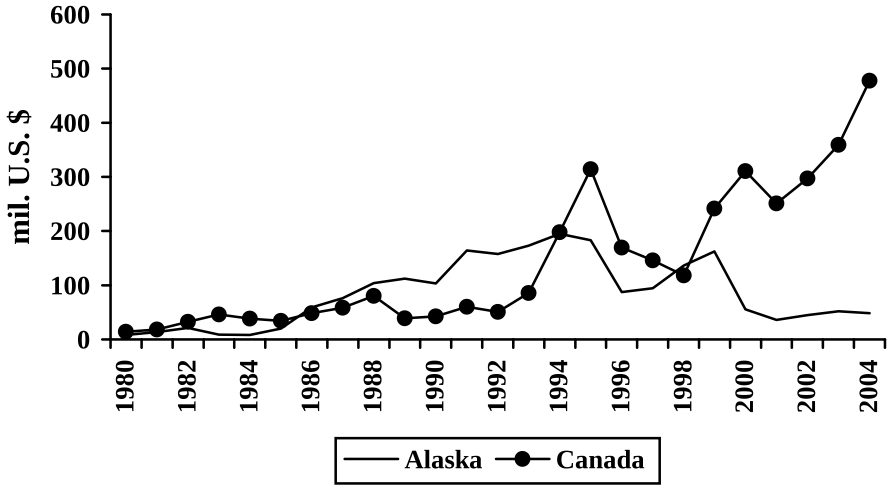

Figure 4. Alaska and Canada Snow (Queen) Crab Exvessel Revenues from 1980 to 2004 (million of U.S. dollars).

The decline of the snow crab fishery followed the pattern set back in the late 1980s when the Bristol Bay king crab fishery, then the economic mainstay of the fleet, had essentially collapsed. But, unlike this earlier event when the crab fleet was able to turn to the snow crab fishery, lucrative alternative fisheries were not available. With no substantial increases to snow crab GHL (or TAC under crab rationalization) on the horizon, and additional concerns that in any given year the fishery may close, the Alaska crab fleet is hard pressed to solely rely on the snow crab fishery as its economic base in the future. This has come at a time when the Alaska crab fleet is already economically vulnerable. The depressed conditions of the Alaska crab fisheries have ramifications beyond those accruing to harvesters. Crab has been a principal product for many Alaska processors and communities. Processors have built necessary capacity, much of it in remote areas, to meet the needs of the Alaska crab fisheries.

A major “shake-out” is imminent within the Alaska crab industry as a crab rationalization program is implemented in 2005. This program includes harvester and processor transferable quotas, as well as community protection, and is referred to as the “three-pie voluntary cooperative program” (NPFMC 2004). The transferable quota system will be unique among U.S. commercial fisheries, as both harvester-only and processor-only quota shares will be allocated to harvesters and processors. The rationalization program has elicited a broad array of industry responses ranging from the enthusiastic to the skeptical, and is highly controversial. Benefits of Individual Transferable Fishery Quotas (IFQs) to fishermen are well understood (Squires et al. 1995, NRC 1999, NOAA 2004). The issuance of transferable processor quotas (IPQs) is a more novel and contentious concept. The stated rational for processor quotas is that they protect processors against losses in the fishery due to the non-malleable nature of their capital investment made during an alternative (non-rationalized) fishery structure. The financial difficulties experienced by Alaska halibut processors following an IFQ program in that fishery were offered in support of an IPQ program in the Alaskan crab fishery in addition to IFQs (Matulich 2002).

This economic analysis of the exvessel revenues accruing to the snow crab industry represents initial findings from a subset of a comprehensive model being constructed for the Alaska snow and king crab industries. As such, presented results will likely change as the more comprehensive model for the North Pacific Research Board (NPRB) is completed. This initial modeling effort focused on 2002. This was the last year that the National Marine Fisheries Service collected cold-storage holdings and thus is the last year that comprehensive supply and demand models for fisheries can be undertaken. As the analysis focuses on 2002 (a period that is pre-crab rationalization) the extrapolation of these findings to the post-rationalization crab fisheries must be qualified. To the extent that crab prices may increase post-rationalization the estimated exvessel revenues may be considered a lower-bound on post-rationalization exvessel revenues. It is highly doubtful that Alaska crab exvessel prices will rise to the extent that post-IFQ halibut prices did as the U.S. dominates the Pacific halibut supply whereas Canada dominates the snow (Queen) crab supply. However, some price increase may result.

The results that follow are from modeling efforts that focused exclusively on the snow crab industry (independent from the king crab industry). An international snow crab market model was constructed that examines the relationship between snow crab harvests, prices and revenues (figure 5).

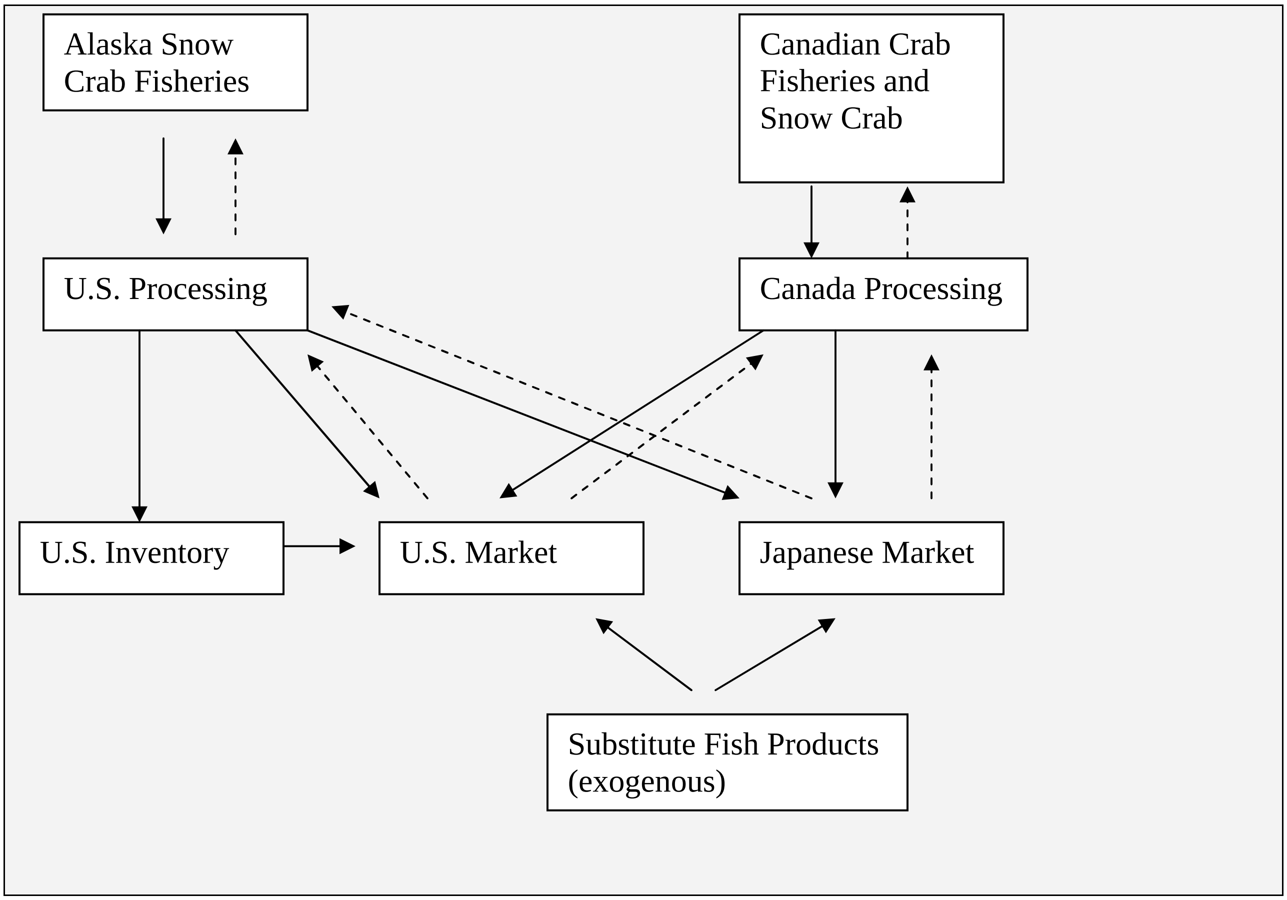

Figure 5. Alaska and Canada Modeled Snow Crab Market Flowchart.[a]
a. The solid arrows represent product flow and the dashed arrows represent money flow.

The behavioral equations were estimated using the three-stage least squares (3SLS) econometric method. Dynamic simulations were performed by combining the Newton Algorithm with Monte Carlo simulations. The simulated prices were used to perform two major sensitivity analyses for the 2002 season. The first analysis was conducted by varying Alaska landings holding all other variables constant at their 2002 levels. This was done to estimate a demand and a total exvessel revenue curve for the Alaska snow crab industry. The second analysis repeated the first but the simulations were performed varying Canadian harvest levels to investigate the effects of the substantial Canadian snow crab landings on the markets for U.S. snow crab.

Alaska exvessel revenues are affected in two ways as Alaska snow crab landings are varied in the analysis. They vary with both the changes in harvest levels and with the resulting changes in exvessel prices, simulated from all the interactions captured in the estimated system of equations. The total exvessel revenue curve was estimated by varying Alaska snow crab landings away from their 2002 level of just over 30 million pounds (with an associated simulated exvessel revenue of $45.8 million) while holding all other variables at their actual 2002 levels. Inspection of Figure 6 shows that simulated Alaskan exvessel revenues initially increase with growth in Alaskan landings, reach a peak of $161 million at 230 million pounds, and then sharply decline with further expansion of landings.

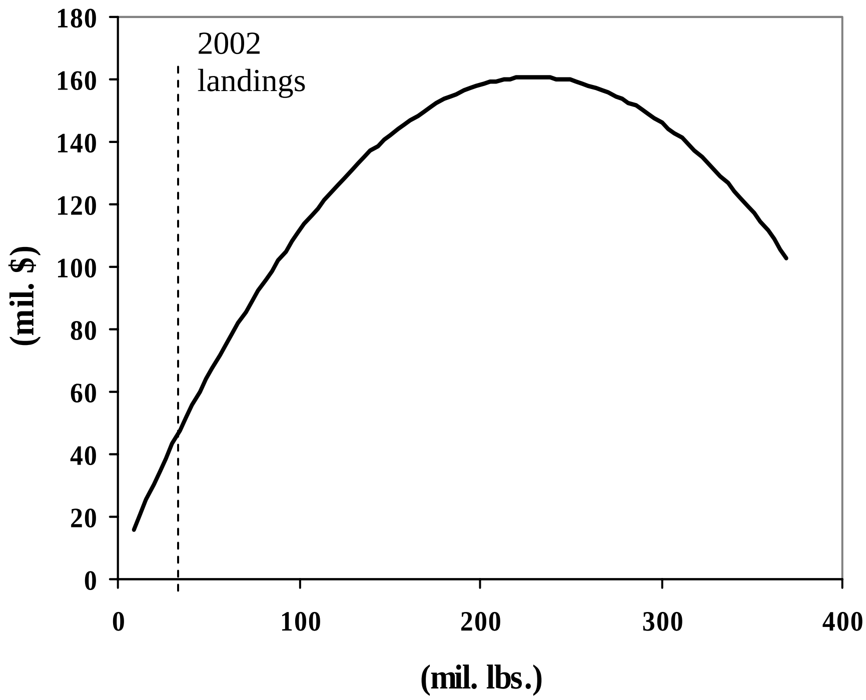

Figure 6. Simulated 2002 Alaska snow crab exvessel revenues for changes in Alaska snow crab landings.

In evaluating these results, it is important to note that in 2002 the Alaska snow crab harvest of just over 30 million pounds made a relatively small contribution to a world snow crab market dominated by the Canadian snow crab harvest of 235.5 million pounds. Alaska appears to have been a price taker with wholesale price and exvessel price relatively insensitive to changes in the Alaska harvest level. Given this insensitivity of Alaska prices to changes in volume at low landings levels, exvessel revenues first grow at a rate similar to that of changes in landings. However, as Alaska landings are expanded in the sensitivity analysis (and Alaska accounts for a growing share of world supply) its prices become increasingly sensitive to further changes in landings. As Alaska snow crab landings are expanded beyond 230 million pounds, the rate of decline in Alaska exvessel prices exceeds the rate of growth in landings and consequently Alaska exvessel revenues decline.

Although, there are sizeable confidence intervals around the level of simulated landings that would maximize total exvessel revenue, it is very evident that any foreseen plausible increase (decrease) in Alaska snow crab landings will increase (decrease) exvessel revenues.

A further examination of the effects that the Canadian snow crab harvest levels have had on the Alaska snow crab industry can be simulated by reducing the Canadian harvest to its lower levels of previous years. For example, the total revenue curve for the Alaska 2002 snow crab season, under different harvest levels, was simulated fixing the Canadian snow crab harvest at its 1989 level of 49.3 million pounds (which is less than one-fifth of its 2002 landings). This total revenue curve is compared to the simulated total revenue curve when Canadian landings were at their 2002 levels. It is evident that the sustained increases in Canada snow crab harvests have put downward pressure on Alaska snow crab exvessel revenues (figure 7).

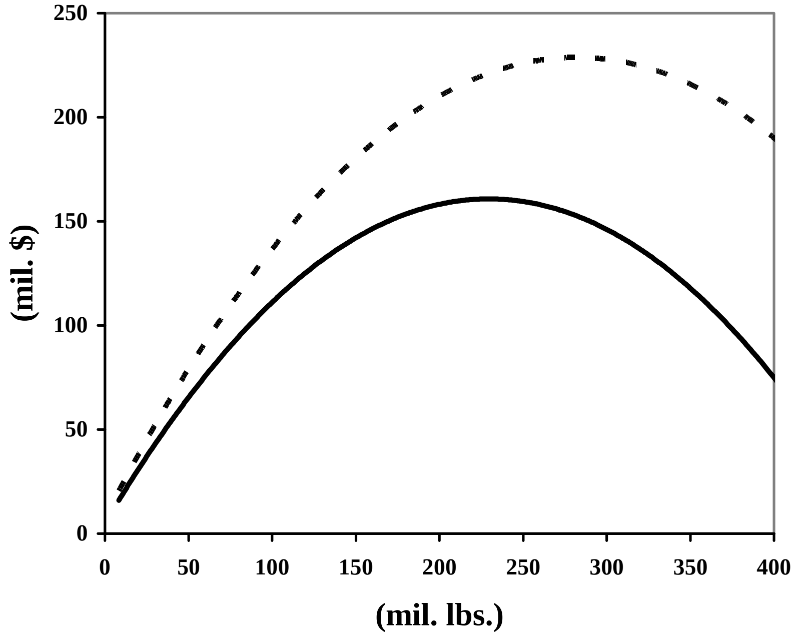

Figure 7. Simulated 2002 Alaska snow crab exvessel revenues for changes in Alaska snow crab landings (solid line) and with Canadian landings fixed at 1989 level of 49.3 million pounds (dashed line).

The simulated decrease in the 2002 price, due to Canadian snow crab harvest being increased from its 1989 to 2002 level, is $0.30 per pound or a decrease in total exvessel revenue of $10 million. At the lower Canadian snow crab harvest level, the model simulates an Alaskan snow crab exvessel revenue curve that is maximized at Alaska landings of 282 million pounds. This would maximize the simulated snow crab exvessel revenue at $229 million with an exvessel price of $0.81/lb. This simulated Alaskan snow crab exvessel revenue maximum is $64 million greater than that achieved when Canadian snow crab harvest is set to its actual 2002 level.

As mentioned, a more comprehensive integrated model is being constructed to understand the simultaneous nature of the world's harvest of snow (and historically Tanner) and king crab originating from Alaska, Canada, Russia and Greenland. Figure 8 illustrates Alaska's declining position as a supply source of these combined crab species. Alaska's share of total world supply of the combined crab species peaked in 1991 at 62% and Alaska landings accounted for only 14% of world supplies in 2003. In contrast, Canada achieved a 62% share of word supplies in 2002 and a slightly lower 59% share in 2003.

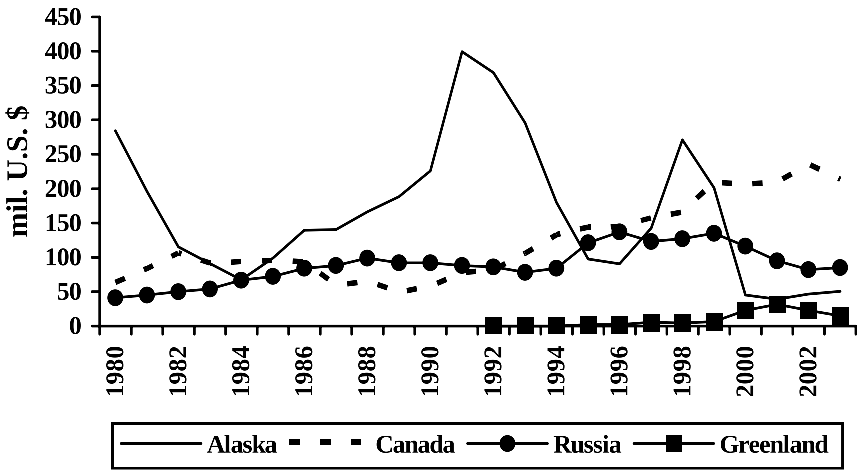

Figure 8. World landings of king, Tanner and snow crab by country (1980 to 2003).

As noted, the international snow crab market model is being expanded to include Alaska king crab. The reconstructed model will include the allocation of Alaska king crab to its two major markets, the United States and Japan and exvessel price formation. The combined snow crab and Alaska king crab model is comprised of 12 behavioral equations and 16 definitional identities. The behavioral equations are presented below.

- Alaska snow crab allocation to Japan
- U.S. demand for Alaska snow crab
- U.S. demand for Canada snow crab
- Canada snow crab allocation to the U.S.
- Japanese demand for Alaska snow crab
- Japanese demand for Canada crab
- Alaska snow crab exvessel price
- Canada snow crab exvessel price
- Alaska king crab allocation to the U.S.
- U.S. demand for Alaska king crab
- Japanese demand for U.S. king crab
- Alaska king crab exvessel price

The specification of this market model is ongoing at this time. Very preliminary results underscore the pressures the Alaska snow crab and king crab industries have bee subject to in recent years, most notably from greatly expanded snow crab supply coming from eastern Canada, but also from snow crab supplies from Greenland and snow and king crab supplies form Russia. The new model is scheduled to be completed by July 2006.

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(NRC) National Research Council. 1999. *Sharing the Fish: Toward a National Policy on Individual Quotas*. National Academy Press, Washington D.C.

Squires, D., J. Kirkley, and C. Tisdell. 1995. “Individual Transferable Quotas as a Fishery Management Tool.” Reviews in Fisheries Science 3(2).

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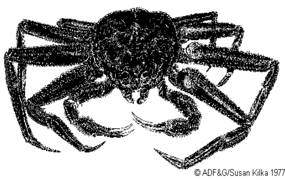
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Kevin Duffy, Commissioner

Doug Mecum, Director
Division of Commercial Fisheries
Juneau

Contact: Forrest R. Bowers
Area Management Biologist
Bering Sea/Aleutian Islands

Westward Region
211 Mission Road
Kodiak, AK 99615

Division of Commercial Fisheries
Phone: (907) 581-1239
Fax: (907) 581-1572

Date: January 2, 2004

TANK INSPECTIONS AND FISHERY MANAGEMENT
FOR THE 2004 BERING SEA SNOW CRAB FISHERY

The 2004 Bering Sea snow crab fishery will open at noon on January 15 with a general fishery guideline harvest level (GHL) of 19.27 million pounds. The post-season community development quota is 1.56 million pounds.

Preseason tank inspections will begin on January 7 in Dutch Harbor, King Cove, Akutan and False Pass pending arrival of ADF&G staff in those locations. Quick registration will begin at noon on January 13 in Dutch Harbor, Akutan, King Cove and False Pass. Tank inspections will be available at noon on January 14 in Saint Paul. Fishers are reminded that the holder of a 2004 T91Q or T09Q Bering Sea Tanner crab interim use permit card and the vessel's observer, if required, must be on the vessel at the time of registration and during all fishing operations. In addition, all pots onboard the vessel and in wet storage must be legally configured when the vessel is registered.

ADF&G will manage the 2004 Bering Sea snow crab fishery based on inseason reports from fishers. Reports will be taken once each day. The reporting period ends at 6:00 AM and is for the previous 24-hour period. Vessels reporting via single side band radio or telephone will report at 10:00 AM and vessels reporting via electronic mail should report by 8:00 AM. ADF&G personnel will provide catch reporting information and will enlist vessels for daily reporting during preseason tank inspections and quick registration. Vessel operators may also obtain inseason catch reporting information from the ADF&G office in Dutch Harbor. Vessel operators are strongly encouraged to participate in this voluntary reporting program.

Advance notice for the fishery closure will be based on actual and anticipated harvest rates. ADF&G will attempt to provide the greatest advance notice possible, however, the fishery could close on as little as 24-hours advance notice. ADF&G will broadcast the closure announcement on SSB 4125 MHz, by fax and e-mail to all persons and organizations on ADF&G's news release distribution list.

-continued-

News release January 2, 2004

Buoy tags may be purchased at the Dutch Harbor and Kodiak offices of ADF&G Monday through Friday, 8:00 AM until 4:30 PM. In addition, the ADF&G office in Dutch Harbor will be open for buoy tag sales from 9:00 AM until 4:30 PM on Saturday January 10 and Sunday January 11.

ADF&G, in conjunction with the United States Coast Guard and National Weather Service, will assess weather conditions prior to the start of tank inspections on January 13 for potential weather-related delay of the season opening, based on search and rescue criteria.

A current information packet for the 2004 Bering Sea snow crab fishery providing a brief overview of fishery management and regulations specific to this fishery is available at the Dutch Harbor and Kodiak ADF&G offices.

For further information contact the ADF&G in Dutch Harbor at (907) 581-1239.

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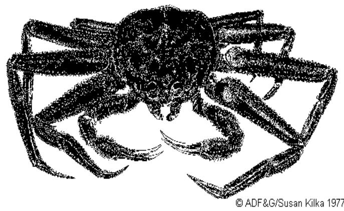
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Kevin Duffy, Commissioner

Doug Mecum, Director
Division of Commercial Fisheries
Juneau

Contact: Karla L. Granath
Assistant Area Management Biologist
Bering Sea/Aleutian Islands

Westward Region
211 Mission Road
Kodiak, AK 99615

Division of Commercial Fisheries
Phone: (907) 581-1239
Fax: (907) 581-1572

Date: January 5, 2004

VESSEL REGISTRATION AND MANAGEMENT FOR THE 2004 EASTERN ALEUTIAN DISTRICT TANNER CRAB FISHERY

The Eastern Aleutian District of Tanner crab Registration Area J will open to commercial *C. bairdi* Tanner crab fishing at noon on January 15, 2004 with a guideline harvest level of 87,891 pounds in Makushin Bay and 47,219 pounds in Unalaska Bay. The minimum size limit is 5.5 inches carapace **width** and only male crabs may be retained.

Tank inspections, courtesy gear inspections, and vessel registration will begin at noon on January 14 in Dutch Harbor. Fishers are reminded that the holder of a 2004 T91O or T09O Dutch Harbor Tanner crab interim use permit card must be onboard the vessel at the time of registration and during all fishing operations. In addition, all pots onboard the vessel and in wet storage must be legally configured when the vessel is registered.

In the Eastern Aleutian District, pots may be operated to take Tanner crab only from 8:00 a.m. to 5:59 p.m., with a soak time of 14 hours, from 6:00 p.m. to 7:59 a.m., according to regulation 5 AAC 35.510 (d) FISHING SEASONS FOR REGISTRATION AREA J.

ADF&G will manage the 2004 Eastern Aleutian District Tanner crab fishery based on inseason reports from fishers. Catch reporting from all registered vessels is mandatory under regulation 5 AAC 35.558 REPORTING REQUIREMENTS FOR REGISTRATION AREA J. Reports must be filed daily by 8:00 p.m. to the department, regardless of whether or not you operated gear that day. Fishers must report the number of pot lifts, the number of crab retained for the 10-hour fishing period preceding the report, and the area (bay) in which fishing occurred. Reporting worksheets will be available to all vessels at the time of registration.

For additional information, please contact the Alaska Department of Fish and Game in Dutch Harbor (907-581-1239) or in Kodiak (907-486-1840).

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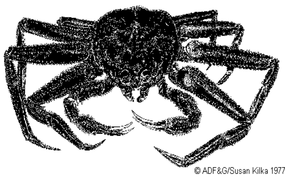

Kevin Duffy, Commissioner

Doug Mecum, Director
Division of Commercial Fisheries
Juneau

Contact: Forrest R. Bowers
Area Management Biologist
Bering Sea/Aleutian Islands

Westward Region
211 Mission Road
Kodiak, AK 99615

Division of Commercial Fisheries
Phone: (907) 581-1239
Fax: (907) 581-1572

Date: January 13, 2004

SEASON OPENING OF THE 2004 BERING SEA SNOW CRAB FISHERY

The Alaska Department of Fish and Game, United States Coast Guard and National Weather Service have completed a review of weather conditions surrounding the opening of the Bering Sea snow crab fishery. Current and forecast weather and sea conditions in the operational area of vessels involved in the Bering Sea snow crab fishery have met United States Coast Guard search and rescue criteria and the season will open as scheduled. Fishers are advised that the master of each vessel is responsible for the ultimate safety of the vessel.

The Bering Sea snow crab fishery will open at noon on January 15, 2004. Tank inspections and "quick registration" in Dutch Harbor, Akutan, King Cove and False Pass will begin at noon on January 13, 2004. Tank inspections in Saint Paul will begin at noon on January 14, 2004.

For further information contact the Alaska Department of Fish and Game in Dutch Harbor at (907) 581-1239.

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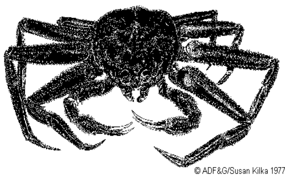

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Kevin Duffy, Commissioner

Doug Mecum, Director
Division of Commercial Fisheries
Juneau

Contact: Forrest R. Bowers
Area Management Biologist
Bering Sea/Aleutian Islands

Westward Region
211 Mission Road
Kodiak, AK 99615

Division of Commercial Fisheries
Phone: (907) 581-1239
Fax: (907) 581-1572

Date: 3:00 PM, January 22, 2004

CLOSURE OF THE 2004 BERING SEA SNOW CRAB FISHERY

The Bering Sea District will close to commercial fishing for snow crab at 10:00 PM on Friday January 23, 2004.

The Bering Sea District snow crab fishery was managed using inseason catch reports from fishers. Through 6:00 AM January 22, 2004, the total projected harvest is approximately 15.5 million pounds. At the current harvest rate, the 19.269 million pound general fishery guideline harvest level will be reached by 10:00 PM on January 23, 2004.

At the time of the closure all gear remaining on the fishing grounds must be unbaited with the doors secured fully open. All fishing gear must be in legal long-term wet storage or removed from the grounds within fourteen days of the closure.

Fishers delivering to a floating or shore-based processor in the Pribilof Islands must be at their delivery location within 48 hours of the closure. The northerly extent of sea ice during the 2004 season has allowed fishers to operate in locations requiring greater than 24 hours of travel time to the Pribilof Islands. Landing requirements for the Pribilof Islands are being extended an additional 24 hours thereby allowing fishers the opportunity to utilize all available fishing time.

Fishers delivering from the Eastern Subdistrict to Dutch Harbor, Adak, Akutan or King Cove must be at their delivery location within 24 hours of the closure. Fishers delivering from the Western Subdistrict to Dutch Harbor, Akutan, Adak or King Cove must be at their delivery location within 72 hours of the closure. Fishers delivering to Adak, King Cove and ports east of King Cove may request additional travel time by contacting ADF&G in Dutch Harbor within 24 hours of the closure.

For further information contact the Alaska Department of Fish and Game in Dutch Harbor at (907) 581-1239.

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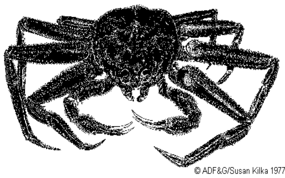

Kevin Duffy, Commissioner

Doug Mecum, Director
Division of Commercial Fisheries
Juneau

Contact: Barbi J. Failor-Rounds
CDQ Program Management Biologist
Bering Sea/Aleutian Islands

Westward Region
211 Mission Road
Kodiak, AK 99615

Division of Commercial Fisheries
Phone: (907) 581-1239
Fax: (907) 581-1572

Date: January 27, 2004

2004 BERING SEA CDQ SNOW CRAB FISHERY ALLOCATIONS

The 2004 general fishery for Bering Sea snow crab closed at 10:00 PM on January 23, 2004. The department estimates that the general fishery harvest will be 21,888,394 pounds. The 2004 Community Development Quota (CDQ) allocation is seven and one half percent of the total harvest of snow crab. The total harvest is defined as the general fishery harvest plus the CDQ harvest. The CDQ allocation based on the above harvest amount is 1,774,735 pounds. When processing of the general fishery harvest is complete, the department may amend CDQ fishing permits with the final CDQ allocation.

The CDQ groups are to direct fishing operations in a manner not to exceed their specific allocation. All deadloss must be included on the processor report and fish ticket; deadloss will be included in the total harvest for each group.

Allocations for the 2004 Bering Sea CDQ snow crab fishery are as follows:

APICDA	8%	141,979 pounds
BBEDC	20%	354,947 pounds
CBSFA	20%	354,947 pounds
CVRF	17%	301,705 pounds
NSEDC	18%	319,452 pounds
YDFDA	17%	301,705 pounds

For further information, contact the Alaska Department of Fish and Game in Dutch Harbor at 907-581-1239.

-end-

ALASKA DEPARTMENT OF FISH AND GAME
COMMERCIAL FISHERIES
NEWS RELEASE

Kevin Duffy, Commissioner

Doug Mecum, Director
Division of Commercial Fisheries
Juneau

Contact: Karla L Granath
Assistant Area Management Biologist
Bering Sea / Aleutian Islands

Westward Region
211 Mission Road
Kodiak, AK 99615

Division of Commercial Fisheries
Phone: (907) 581-1239
Fax: (907) 581-1572

Date: January 30, 2004
4:00 PM

CLOSURE OF ALEUTIAN ISLANDS GOLDEN KING CRAB FISHERY WEST OF 174° W LONGITUDE

The Aleutian Islands (Area O) opened to commercial fishing for golden king crabs on August 15, 2003 with guideline harvest levels (GHL) of 3.0 million pounds east and 2.7 million pounds west of 174° W long. That portion of Area O east of 174° W long., closed to commercial fishing on September 8, 2003. Fishing effort west of 174° W long., has fluctuated throughout the season from two to six vessels, currently four vessels are participating. Weekly harvest has ranged from zero to 187,880 pounds per week and has averaged 129,000 pounds per week since January 5, 2004. Through January 30, 2004, approximately 2.57 million pounds of golden king crabs have been harvested from Area O west of 174° W long., and at the current harvest rate, the GHL of 2.7 million pounds will be reached by NOON Friday, February 6, 2004. Therefore, the Aleutian Islands golden king crab fishery west of 174° W long. will close to commercial fishing at 12:00 NOON February 6, 2004.

All golden king crab pots in Area O west of 174° W long., must be unbaited and have doors secured fully open by the time of the closure. Given fleet distribution during the 2003/04 fishery and distance from the most westerly grounds in the registration area to delivery locations in the eastern Aleutian Islands, landing requirements have been extended. Fishers delivering golden king crabs to processors in Dutch Harbor or Akutan must be at their delivery location within 96 hours of the closure. Fishers delivering golden king crabs to King Cove or points east of King Cove may request additional time to reach those ports.

For further information, contact the Alaska Department of Fish and Game in Dutch Harbor at (907) 581-1239.

ALASKA DEPARTMENT OF FISH AND GAME
COMMERCIAL FISHERIES
NEWS RELEASE

Kevin Duffy, Commissioner

Doug Mecum, Director
Division of Commercial Fisheries
Juneau

Contact: Karla L. Granath
Assistant Area Management Biologist
Bering Sea/ Aleutian Islands

Westward Region
211 Mission Road
Kodiak, AK 99615

Division of Commercial Fisheries
Phone: (907) 581-1239
Fax: (907) 581-1572

Date: February 2, 2004
3:30 PM

CLOSURE OF MAKUSHIN BAY IN THE EASTERN ALEUTIAN DISTRICT TANNER CRAB FISHERY ANNOUNCED

The Makushin Bay portion of the Eastern Aleutian District will close to commercial Tanner crab fishing at 12:00 NOON on Tuesday, February 3, 2004. Catch reports and landings indicate that approximately 78,186 pounds of Tanner crab have been harvested and at the current rate the GHL of 87,891 pounds will be reached by the fishery closure at NOON Tuesday, February 3, 2004. All areas of the Eastern Aleutian District are now closed to commercial Tanner crab fishing.

All pots remaining within the closed area must be unbaited with doors secured open at the time of the closure. Unbaited pots may be stored in the closed area in waters deeper than 25 fathoms for seven days and in waters less than 25 fathoms for up to seven days following the closure. After seven days, all pots must be removed from the water. Vessel operators are required to be at their port of delivery within 24-hours of the closure and to notify the Department of Fish and Game in Dutch Harbor of their intended delivery time and location.

For further details, contact the Alaska Department of Fish & Game in Dutch Harbor at (907) 581-1239.

-end-

ALASKA DEPARTMENT OF FISH AND GAME
COMMERCIAL FISHERIES
NEWS RELEASE

Kevin Duffy, Commissioner

Doug Mecum, Director
Division of Commercial Fisheries
Juneau

Contact: Forrest R. Bowers
Area Management Biologist
Bering Sea/Aleutian Islands

Westward Region
211 Mission Road
Kodiak, AK 99615

Division of Commercial Fisheries
Phone: (907) 581-1239
Fax: (907) 581-1572

Date: March 12, 2004
12:00 PM

PRIBILOF DISTRICT CLOSES
TO COMMERCIAL FISHING FOR GOLDEN KING CRABS

The Pribilof District of king crab Registration Area Q (Bering Sea) opened to commercial fishing for golden king crabs at 12:01 AM January 1, 2004 with a guideline harvest level (GHL) of 150,000 pounds. A total of five vessels have participated in the fishery. Through March 11, 2004, approximately 136,700 pounds of golden king crabs have been harvested and at the current harvest rate, the GHL will be reached by 11:59 PM Friday, March 12, 2004. Therefore, the Pribilof District will close to commercial fishing for golden king crabs for the remainder of 2004 at 11:59 PM, Friday, March 12, 2004.

Vessel operators are reminded that all pots must be unbaited and have doors secured fully open at the time of the closure. All vessels delivering to Dutch Harbor, Akutan, King Cove or the Pribilof Islands must be at their port of delivery within 30 hours of the closure except that vessels delivering to King Cove or ports east of King Cove may request additional delivery time. All pots must be in legal wet storage or removed from the water within 72 hours of the closure.

For further information, contact the Alaska Department of Fish and Game in Dutch Harbor at (907) 581-1239.

ALASKA DEPARTMENT OF FISH AND GAME
COMMERCIAL FISHERIES
NEWS RELEASE

Kevin Duffy, Commissioner

Doug Mecum, Director
Division of Commercial Fisheries
Juneau

Contact: Karla L. Granath
Assistant Area Management Biologist
Bering Sea/Aleutian Islands

Westward Region
211 Mission Road
Kodiak, AK 99615

Division of Commercial Fisheries
Phone: (907) 581-1239
Fax: (907) 581-1572

Date: July 1, 2004

2004 PETREL BANK RED KING CRAB SEASON

The Alaska Department of Fish & Game has completed analysis of fishery and observer data to evaluate the status of the red king crab stock in the Petrel Bank area of king crab Registration Area O. The Petrel Bank area is defined at those waters of king crab Registration Area O west of 179° W long., east of 179° E long., and north of 51° 45’ N lat.

Shell-age and size composition data collected during surveys in 2001 and commercial fisheries in 2002 and 2003 indicate that primarily older, post-recruit crabs have supported the Petrel Bank red king crab fishery. Few recruit or prerecruit size crabs were caught in either the 2002 or 2003 commercial fisheries. Fishery performance and observer data indicate that recent harvests were largely supported by a single aging cohort of crab and that there is little possibility of new recruitment to the legal size class in the next two years. The low level of sublegal and recruit size crab captured in 2002 and 2003 coincides with an increase in the average size and weight of landed crabs and a decrease in legal male CPUE. The localized nature of the commercial harvest and the decrease in legal male CPUE indicates the stock is in decline.

The harvest approach developed after the 2001 surveys specifies that the fishery should be managed to maintain a minimum CPUE of 10 legal crabs per pot lift. If the CPUE falls below 10 for two consecutive years the fishery will be closed. The threshold level was intended to help maintain multiple size and age classes in the population and to prevent localized depletion. The 2003 fishery closed with a legal male CPUE that was at the threshold level of 10, however legal male CPUE decreased 44% between the 2002 and 2003 seasons and 64% between the 2001 surveys and the 2003 fishery.

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News Release July 1, 2004
2004 Petrel Bank red king crab season

Given the recent trend in CPUE, it is likely that catch rates in 2004 would fall below the threshold level. The trend in legal male CPUE coupled with a continued lack of recruitment to the legal size class and dependence of the harvest on a single, aging cohort indicate that continuation of the harvest approach developed in 2001 is likely to jeopardize the reproductive potential of the stock and would be inconsistent with the Alaska Board of Fisheries Policy on King Crab Management. In order to ensure the long-term reproductive viability of the stock and to promote rebuilding, the fishery will not open in 2004.

Data collected by observers during the 2003 commercial fishery indicate a mode of sublegal crab centered at 86-90 mm carapace length. These crabs should begin to enter the legal size class in two years, therefore the department plans to survey the stock in the fall of 2006, on the third year after the closure. Survey results will be compared to those obtained in 2001. The fishery could reopen if adequate recruitment to the legal size class has occurred and if the harvest would not jeopardize the long-term health of the stock.

For further information, contact the Alaska Department of Fish and Game in Dutch Harbor at (907) 581-1239.

-end-

ALASKA DEPARTMENT OF FISH AND GAME
COMMERCIAL FISHERIES
NEWS RELEASE

Kevin Duffy, Commissioner

Doug Mecum, Director
Division of Commercial Fisheries
Juneau

Contact: Karla L. Granath
Assistant Area Management Biologist
Dutch Harbor

Westward Region
211 Mission Road
Kodiak, AK 99615

Division of Commercial Fisheries
Phone: (907) 581-1239
Fax: (907) 581-1572

Date: July 13, 2004

ALEUTIAN ISLANDS GOLDEN KING CRAB FISHERY OPENS AUGUST 15
GUIDELINE HARVEST LEVELS ANNOUNCED

The 2004/05 Area O (Aleutian Islands) commercial golden king crab fishery will open at NOON on Sunday, August 15, 2004. A guideline harvest level of 5.7 million pounds has been established, with 3.0 million pounds of golden king crabs available in the area east of 174° W long., and 2.7 million pounds available west of 174° W long. While the 2004/05 GHL remains unchanged from the 2003/04 level, the department has noted a continued decline since 2000, in the catch of sublegal male golden king crabs in the area east of 174° W long. The 2003 catch of sublegal males was the lowest in the last six years. The department will continue to evaluate the status of the stock relative to the GHL.

The 2004/05 fishery will be managed inseason using processor production reports, fishery performance data collected by observers stationed on each vessel registered for the fishery and reports from fishers. Vessel registration will begin at NOON on Thursday, August 12, 2004 in Dutch Harbor. The department will be offering tank inspections in Adak beginning late afternoon August 12, 2004 pending arrival of ADF&G staff in Adak. The department is providing tank inspections in Adak this year on a trial basis at the request of industry. Vessel tank inspections prior to gear loading will only be available in Dutch Harbor beginning at 9:00 AM, Monday, August 9, 2004. An observer briefing must be scheduled and an individual holding a Commercial Fisheries Entry Commission 2004 Aleutian Islands king crab interim use permit card (K91O or K09O) must be aboard the vessel when it is registered. At the time of registration, all pots onboard the vessel or in wet storage must be in compliance with current Aleutian Islands commercial golden king crab fishing regulations.

For further details contact the Alaska Dept. of Fish & Game in Dutch Harbor at (907) 581-1239 or in Kodiak, at (907) 486-1840.

-end-

ALASKA DEPARTMENT OF FISH AND GAME
COMMERCIAL FISHERIES
NEWS RELEASE

Kevin Duffy, Commissioner

Doug Mecum, Director
Division of Commercial Fisheries
Juneau

Contact: Forrest R. Bowers
Area Management Biologist
Bering Sea/Aleutian Islands

Westward Region
211 Mission Road
Kodiak, AK 99615

Division of Commercial Fisheries
Phone: (907) 581-1239
Fax: (907) 581-1572

Date: August 17, 2004

SAINT MATTHEW ISLAND SECTION AND PRIBILOF DISTRICT KING CRAB SEASONS

The Alaska Department of Fish & Game (ADF&G) and the National Marine Fisheries Service (NMFS) have completed analysis of the 2004 NMFS trawl survey results for the Pribilof District and Saint Matthew Island Section of king crab Registration Area Q. King crab population and biomass estimates for these areas were made using survey data. Based on survey results, the Saint Matthew Island Section blue king crab and the Pribilof District red and blue king crab fisheries will remain closed for the 2004 season.

Saint Matthew Island Section blue king crab: Survey estimates for Saint Matthew blue king crabs indicate continued low abundance of mature male and female crabs. The stock is above the mature male biomass threshold of 2.9 million pounds of mature males. However, the calculated general fishery guideline harvest level (GHL) is only 0.592 million pounds, well below the harvest strategy minimum GHL of 2.5 million pounds.

Pribilof District red and blue king crab: Survey results of Pribilof District blue king crabs indicate continued low abundance. The abundance of blue king crabs estimated by ADF&G is lower in 2004 than in 2003 and NMFS area swept estimates of abundance are the lowest ever. The minimum threshold for a fishery opening is a total mature biomass estimate of at least 13.2 million pounds of blue king crabs for two consecutive years. The 2003 TMB estimate was 4.1 million pounds of mature male blue king crabs and the 2004 estimate decreased to 0.5 million pounds of blue king crabs, the lowest ever and approximately 4% of the threshold value. The Pribilof blue king crab stock has not achieved the minimum threshold for opening and will remain closed.

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Saint Matthew Island Section and Pribilof District king crab seasons — August 17, 2004

The estimate of mature male red king crab abundance in the Pribilof District decreased slightly from the 2003 estimate and the precision of the estimate is low with a confidence interval of ± 56%. Given poor precision in the abundance estimates for this stock, stock levels and trends are difficult to evaluate. Due to the continued decline in the blue king crab stock, the high degree of uncertainty surrounding the estimate of red king crab abundance, and concern for blue king crab bycatch, the red king crab fishery in the Pribilof District will remain closed for the 2004 season.

Bristol Bay red king and Bering Sea Tanner crab: The Bristol Bay red king crab and Bering Sea Tanner crab GHLs will be announced on Friday, September 3, 2004.

For further information contact the Alaska Dept. of Fish & Game in Dutch Harbor at (907) 581-1239 or in Kodiak, at (907) 486-1840.

-end-

ALASKA DEPARTMENT OF FISH AND GAME

COMMERCIAL FISHERIES

NEWS RELEASE

Kevin Duffy, Commissioner

Doug Mecum, Director
Division of Commercial Fisheries
Juneau

Contact: Karla L Granath
Assistant Area Management Biologist
Bering Sea / Aleutian Islands

Westward Region
211 Mission Road
Kodiak, AK 99615

Division of Commercial Fisheries
Phone: (907) 581-1239
Fax: (907) 581-1572

Date: August 25, 2004
4:30 PM

EASTERN ALEUTIAN ISLANDS CLOSES TO GOLDEN KING CRAB FISHING

The commercial golden king crab fishery in that portion of Area O (Aleutian Islands) east of 174° W long. will close effective at 8:00 PM on August 29, 2004. Inseason catch reports indicate that the guideline harvest level (GHL) of 3.0 million pounds will be reached by the August 29, 2004 closure.

At the time of the closure, all golden king crab pots east of 174° W long. must be unbaited and have the doors secured open. Within 72 hours of the closure, all golden king crab pots must be legally stored in waters 75 fathoms or less in depth, or be removed from the water. That portion of Area O west of 174° W long. has a GHL of 2.7 million pounds and will remain open until further notice.

For further information, contact the Alaska Department of Fish and Game in Dutch Harbor at (907) 581-1239.

ALASKA DEPARTMENT OF FISH AND GAME
COMMERCIAL FISHERIES
NEWS RELEASE

Kevin Duffy, Commissioner

Doug Mecum, Director
Division of Commercial Fisheries
Juneau

Contact: Forrest R. Bowers
Area Management Biologist
Dutch Harbor

Westward Region
211 Mission Road
Kodiak, AK 99615

Division of Commercial Fisheries
Phone: (907) 581-1239
Fax: (907) 581-1572

Date: September 3, 2004

BRISTOL BAY RED KING AND BERING SEA TANNER CRAB SEASONS

The Alaska Department of Fish & Game and National Marine Fisheries Service (NMFS) have completed analysis of NMFS trawl survey data for Bristol Bay red king and Bering Sea Tanner crabs. Abundance and biomass estimates were computed using survey data and length-based analysis model output.

Bristol Bay red king crab:

The Bristol Bay red king crab stock is estimated to be above the minimum stock size and mature female abundance thresholds. The Effective Spawning Biomass (ESB) of the Bristol Bay red king crab stock is estimated to be 61.9 million pounds. Based on the 2004 data, ESB increased 7% between 2003 and 2004. Mature male abundance increased 6% over the 2003 estimate and legal male abundance increased 3%. Since the ESB estimate is greater than 55.0 million pounds, a 15 percent exploitation rate was applied to the estimated mature male abundance to derive guideline harvest levels (GHL) for the 2004 season as follows:

Fishery	**GHL (million pounds)**
Bristol Bay red king crab	14.267 (general)[1]
Bristol Bay CDQ red king crab	1.157 (CDQ)
	15.424 (total)

[1] The North Pacific Fishery Management Council has capped the American Fisheries Act (AFA) vessels to their historic proportion of the Bristol Bay red king crab harvest during the general fishery. The 41 AFA vessels' harvest will be capped at 10.96 percent (1.564 million pounds) of the general fishery GHL.

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Bristol Bay red king and Bering Sea Tanner crab seasons

September 3, 2004

The preseason registration deadline to participate in the 2004 Bristol Bay red king crab general fishery is 5:00 PM Friday, September 24, 2004. Preseason registration forms are available on the web at **http://www.cf.adfg.state.ak.us/region4/shellfsh/crabs/04bbrkc_form.pdf** or via fax upon request.

A 2004 Commercial Fisheries Entry Commission interim use permit for Bristol Bay king crab, listing the vessel's ADF&G number is required at the time of preseason registration. After the preseason registration deadline the department will announce the names of vessels selected to carry an onboard observer.

The following web site is available for vessel operators to verify the state's receipt of preseason registration: **http://www.cf.adfg.state.ak.us/region4/shellfsh/crabs/04bbrkc_reg.pdf.** This web site is updated three times per week.

Because the 2004 Bristol Bay red king crab GHL is greater than 12.0 million pounds, the number of vessels preseason registered will not be used to determine pot limits. The 2004 Bristol Bay red king crab pot limit is 200 pots for vessels less than or equal to 125 feet in overall length and 250 pots for vessels greater than 125 feet in overall length. Buoy tags for the Bristol Bay red king crab general fishery will be available for purchase during normal office hours at the Dutch Harbor and Kodiak ADF&G offices beginning Tuesday, September 7, 2004. In addition, buoy tags will be available for purchase in Dutch Harbor on Saturday, October 9 and Sunday, October 10, 2004 between 9:00 AM and 4:30 PM. Buoy tags will be available by mail order beginning Monday, September 13, 2004. Buoy tags will not be mailed after Friday, October 1, 2004.

Tanner crab:

The Bering Sea Tanner crab biomass remains below the threshold necessary to allow a fishery. The Alaska Board of Fisheries harvest strategy for Bering Sea Tanner crabs specifies a mature female biomass threshold of 21.0 million pounds and a minimum GHL threshold of 4.0 million pounds in the waters east of 168° W long. Both thresholds must be met prior to a fishery opening. The 2004 survey estimate of mature female biomass is 13.2 million pounds, a 37% decrease from the 2003 mature female biomass estimate of 20.8 million pounds. Since the mature female biomass threshold was not met, the Bering Sea Tanner crab fishery will not open in 2004.

Snow crab:

Data analysis for Bering Sea snow crab is not complete. Results are expected to be released no later than September 17, 2004.

For further information contact ADF&G in Dutch Harbor at (907) 581-1239 or in Kodiak (907) 486-1840.

-end-

ALASKA DEPARTMENT OF FISH AND GAME
COMMERCIAL FISHERIES
NEWS RELEASE

Kevin Duffy, Commissioner

Doug Mecum, Director
Division of Commercial Fisheries
Juneau

Division of Commercial Fisheries
Phone: (907) 486-1840
Fax: (907) 486-1824

Westward Region
211 Mission Road
Kodiak, AK 99615

Date: September 3, 2004

BERING SEA/ALEUTIAN ISLANDS ANNUAL CRAB INDUSTRY MEETING

The annual meeting with the Bering Sea/Aleutian Islands (BSAI) crab industry and staff of the National Marine Fisheries Service (NMFS), and the Alaska Department of Fish & Game (ADF&G) will be held in Juneau, Alaska on Tuesday evening, September 21, 2004. The annual crab-industry meeting alternates between Alaska and Seattle. When the industry meeting is held in Alaska, the meeting location alternates between Kodiak and Anchorage, however, because the fall Crab Plan Team meeting is in Juneau, the Industry meeting will be held there as well.

The Industry meeting will begin at 6:30 p.m., Alaska time at the Alaska Department of Fish & Game office at 1255 W. 8th Street, Juneau. Teleconference sites will be established in Dutch Harbor at the ADF&G office, in Kodiak at Fishermen's Hall, and in Seattle at the second floor office, Suite 205, of the Pacific Seafood Processors Association (PSPA). The PSPA office is located across from Chinook's Restaurant in Fishermen's Terminal, 1900 W. Emerson Place, Seattle. The preliminary agenda is as follows:

1) Review status of stocks and GHLs.
    a) Bristol Bay red king crab (ADF&G)
    b) Eastern Bering Sea Tanner crab (NMFS/ADF&G)
    c) Snow crab stock assessment (NMFS)
    d) Snow crab GHL (ADF&G)
    e) St. Matthew and Pribilof Islands king crab (ADF&G)

2) Crab Observer Oversight Task Force - observer coverage during rationalization.

For questions regarding the annual industry meeting, please contact Herman Savikko at (907) 465-6112 or Wayne Donaldson at (907) 486-1842.

-end-

ALASKA DEPARTMENT OF FISH AND GAME
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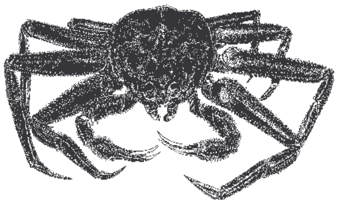

Kevin C. Duffy, Commissioner

Doug Mecum, Director
Division of Commercial Fisheries
Juneau

Contact: Forrest R. Bowers
Area Management Biologist
Bering Sea/Aleutian Islands

Westward Region
211 Mission Road
Kodiak, AK 99615

Division of Commercial Fisheries
Phone: (907) 581-1239
Fax: (907) 581-1572

Date: September 16, 2004

2005 BERING SEA SNOW CRAB SEASON

The Alaska Department of Fish & Game and the National Marine Fisheries Service (NMFS) have completed analysis of NMFS trawl survey results for the Bering Sea District snow crab stock.

The total mature biomass (TMB) of male and female snow crabs in the Bering Sea is estimated to be above the minimum threshold for a fishery opening under the Alaska Board of Fisheries (BOF) harvest strategy. The 2005 snow crab guideline harvest level (GHL) is 20.932 million pounds. Of this total, 1.57 million pounds are available to the Community Development Quota fishery with the remaining 19.362 million pounds available to the general fishery.

Total mature snow crab biomass increased 12% from the 2003 survey, to 343.7 million pounds, and is below the minimum stock size threshold of 460.8 million pounds. The estimated abundance of males greater than four inches carapace width (CW) is 67.6 million crabs, an increase from the 2003 abundance level of 65 million crabs. Old and very-old shell males constitute 33% of males greater than four inches CW, which is comparable to the 2003 estimate of 30%.

The 2005 Bering Sea snow crab pot limit will be 70 pots for vessels less than or equal to 125 feet in overall length and 90 pots for vessels greater than 125 feet in overall length. The regulatory opening date for this fishery is noon on January 15, 2005 in all waters of the Bering Sea District west of 166° W long. The preseason vessel registration deadline to participate in the 2005 Bering Sea snow crab fishery is 5:00 PM December 24, 2004. Preseason registration forms must be received by the department before the deadline. Preseason registration forms are available on

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the world wide web at http://www.cf.adfg.state.ak.us/region4/shellfsh/crabs/05opilio_form.pdf or via fax upon request. A 2004 or 2005 T09Q or T91Q Commercial Fisheries Entry Commission permit card listing the vessel's ADF&G number is required at the time of preseason registration.

The web site for vessel operators to verify the state's receipt of vessel preseason registration is http://www.cf.adfg.state.ak.us/region4/shellfsh/crabs/05opilio_reg.pdf . This web site is updated several times per week.

Bering Sea hair crab: Analysis of hair crab survey data is not complete. Information on Bering Sea hair crab is expected to be available later in September.

For further details contact the Alaska Department of Fish & Game in Dutch Harbor at (907) 581-1239 or in Kodiak at (907) 486-1840.

-end-

ALASKA DEPARTMENT OF FISH AND GAME
COMMERCIAL FISHERIES
NEWS RELEASE

Kevin Duffy, Commissioner

Doug Mecum, Director
Division of Commercial Fisheries
Juneau

Contact: Mary Schwenzfeier
Shellfish Observer Program Coordinator
Dutch Harbor

Westward Region
211 Mission Road
Kodiak, AK 99615

Division of Commercial Fisheries
Phone: (907) 581-1239
Fax: (907) 581-1572

September 27, 2004

Catcher Vessels Selected for Observer Coverage
2004 Bristol Bay Red King Crab Fishery

The following catcher vessels, randomly selected from the Bristol Bay red king crab fishery pre-season vessel registrations, will carry crab observers for the duration of the Bristol Bay general fishery:

Vessels 75 feet to 125 feet

Vessel Name	ADF&G #
Bering Sea	00052
Entrance Point	46496
Vixen	70030
Kona Kai	51347
Western Mariner	00963
Nuka Island	35640
Viking Queen	06434
Kustatan	60210
Lisa Marie	70221
Erla N	20556
North Pacific	06205
Keta	07189
Valiant	00966

Alternates

Destination	42234
Alpine Cove	30100

Vessels greater than 125 feet

Vessel Name	ADF&G #
Scandies Rose	35318
Labrador	12128
Arctic Eagle	61111
American Lady	00067
Wizard	35265

Alternates

Arctic Baruna I	68869
Aleutian Rover	00958

AFA crab vessels

Vessel Name	ADF&G #
Vesteraalen	38342
Aldebaran	48215
Muir Milach	41021

Alternate

American Eagle	00039

-continued-

ADF&G or a state-contracted observer company will provide observers for the selected non-AFA catcher vessels. The observer must be on the selected vessel at the time of vessel registration validation on or before October 14. Selected vessels must provide proof of compliance with United States Coast Guard (USCG) vessel safety requirements. USCG dockside examinations are available in Puget Sound, Kodiak and Dutch Harbor.

Observer salary and travel costs for catcher vessels participating in the general fishery will be provided from cost-recovery funds. Costs for crab observers on the American Fisheries Act (AFA) catcher vessels will be borne by the AFA participants.

Observers will have their own rain gear, boots, gloves, survival suit and personal flotation device (PFD) for working on deck, along with their own bedding and personal items. Some of the regulatory requirements for vessels that carry observers include:

- Provide adequate food and accommodations for the observer equal to those provided for the vessel's crew;
- Provide to the observer daily catch information, including areas fished, number of crab retained, pot locations, number of pots pulled, and other information specified by the department;
- Provide a safe work area, and necessary gear including 2 to 3 totes for the observer to use at all times to hold the contents of crab pots for sampling;
- Assure observer access to single side band (SSB) radio, fax, telex, or telephone so that catch reports from observers are received at the Dutch Harbor ADF&G office in a timely manner.

-end-

ALASKA DEPARTMENT OF FISH AND GAME
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Kevin Duffy, Commissioner

Doug Mecum, Director
Division of Commercial Fisheries
Juneau

Contact: Forrest R. Bowers
Area Management Biologist
Bering Sea/Aleutian Islands

Westward Region
211 Mission Road
Kodiak, AK 99615

Division of Commercial Fisheries
Phone: (907) 581-1239
Fax: (907) 581-1572

Date: October 1, 2004

BRISTOL BAY RED KING CRAB FISHERY
REGISTRATION AND TANK INSPECTION

The Bristol Bay (Registration Area T) red king crab fishery will open at 4:00 PM on October 15. Vessel registration will begin 30 hours prior to the opening, at 10:00 AM on October 14 in Dutch Harbor, False Pass, Akutan and King Cove. ADF&G personnel will not be available in Saint Paul. As part of the "Quick Registration" process, inspection of vessel holding tanks and gear will be available beginning October 8, in Dutch Harbor, King Cove and Akutan. Inspections at False Pass will begin October 10, pending staff arrival there.

The holder of a 2004 KO9T or K91T interim use permit and the vessel's observer, if assigned, must be on the vessel at the time of registration and during all fishing operations. All crab pots used during the Bristol Bay red king crab fishery must conform to specifications of a king crab pot described in 5 AAC 34.050 LAWFUL GEAR FOR KING CRAB and 5 AAC 34.825 LAWFUL GEAR FOR REGISTRATION AREA T. Pot limits of 200 for vessels less than or equal to 125 feet in overall length and 250 for vessels in excess of 125 feet in overall length are in effect for the 2004 Bristol Bay red king crab fishery. All gear, both on the vessel and in wet storage, within Bristol Bay, must be tagged at the time of tank inspection. Only one buoy tag, valid for the current fishery, may be displayed.

The department is assessing the manageability of the 2004 Bristol Bay red king crab fishery and will provide further information on inseason fishery management by Wednesday, October 13, 2004. In addition, ADF&G, in conjunction with the United States Coast Guard and National Weather Service, will assess weather conditions prior to the season opening for potential weather-related delay, based on search and rescue criteria, at the start of the season.

For more information contact the Alaska Department of Fish and Game at 581-1239.

-end-

ALASKA DEPARTMENT OF FISH AND GAME
COMMERCIAL FISHERIES
NEWS RELEASE

Kevin Duffy, Commissioner

Doug Mecum, Director
Division of Commercial Fisheries
Juneau

Contact: Forrest R. Bowers
Area Management Biologist
Bering Sea/Aleutian Islands

Westward Region
211 Mission Road
Kodiak, AK 99615

Division of Commercial Fisheries
Phone: (907) 581-1239
Fax: (907) 581-1572

Date: October 1, 2004

BERING SEA HAIR CRAB FISHERY CLOSED FOR 2004/2005 SEASON

The Alaska Department of Fish and Game (ADF&G) has completed analysis of hair crab data collected during the National Marine Fisheries Service eastern Bering Sea trawl survey. The Bering Sea will not open to commercial fishing for hair crabs during the 2004/2005 season.

In the Northern District, the 2004 estimate of large male hair crab increased 51% from the 2003 level, but remains at approximately one half of the level at which the fishery was last opened in 2000. Catch rates during the 2000 fishery averaged less than one legal crab per pot lift and hair crabs were not found in commercially exploitable concentrations. Fishery data indicate that the Northern District is not capable of sustaining hair crab harvests at the current abundance level. Small male abundance in the Northern District is less than one half the 1989-2000 average abundance level.

In the Pribilof District, male hair crab abundance declined between 1995 and 2003 and commercial fisheries from 1996 through 1999 failed to meet preseason GHLs. The 2004 large male hair crab abundance estimate in the Pribilof District increased 55% from the 2003 level, but remains at less than 9% of the 1989-2000 average. Small male abundance decreased from the 2003 level and is estimated to be only 0.9% of the 1989-2000 average. No significant recruitment of small hair crab has occurred since 1993 and the stock has not begun to rebuild despite closure of the commercial fishery since 1999. The current estimate of total male abundance is the second lowest on record.

In Bristol Bay, the estimated abundance of large male hair crab increased from the 2003 level and is slightly above the 1989-2000 average abundance. The abundance estimates for small male and total male hair crab also exceed the 1989-2000 average. Despite the increase in hair crab abundance in Bristol Bay, the fishery will not open in 2004. Prior fisheries for hair crab in the area failed to meet preseason expectations and the potential for red king crab bycatch in Bristol Bay is high.

For further information, please contact the Alaska Department of Fish and Game in Dutch Harbor at (907) 581-1239.

ALASKA DEPARTMENT OF FISH AND GAME
COMMERCIAL FISHERIES
NEWS RELEASE

Kevin Duffy, Commissioner

Doug Mecum, Director
Division of Commercial Fisheries
Juneau

Contact: Forrest R. Bowers
Area Management Biologist
Bering Sea/Aleutian Islands

Westward Region
211 Mission Road
Kodiak, AK 99615

Division of Commercial Fisheries
Phone: (907) 581-1239
Fax: (907) 581-1572

Date: October 13, 2004

BRISTOL BAY RED KING CRAB FISHERY MANAGEMENT

The Alaska Department of Fish and Game will manage the 2004 Bristol Bay red king crab fishery based on inseason reports from fishers. Reports will be taken every 12 hours at 6:00 AM and 6:00 PM from vessels reporting via electronic mail and every 24 hours at 10:00 AM from vessels reporting via single side band radio (SSB) or telephone. Department personnel will provide inseason catch reporting materials during the tank inspection and registration process as well as at the ADF&G office in Dutch Harbor. Vessel operators are strongly encouraged to participate in the catch reporting program that is essential for effective inseason management. Vessel operators reporting via electronic mail should use the following electronic mail address: **adfg_dutch@fishgame.state.ak.us**.

The department will provide catch updates to the fleet on SSB 4125 kHz at noon and 9:00 PM daily beginning at 9:00 PM on October 16, however a closure announcement could occur at any time. The advance notice for the fishery closure will be based upon actual and anticipated harvest rates. The department will attempt to provide the greatest possible advance notice, however the fishery could close on very short notice. The department will broadcast the closure announcement on SSB 4125 kHz, by fax and electronic mail to all persons and organizations on the department's news release distribution list.

Vessel holding tank and gear inspections are currently available in Dutch Harbor, King Cove, Akutan and False Pass. No tank inspections or registrations will be available in Saint Paul. Prior to the season opening, the department in conjunction with the United States Coast Guard and National Weather Service, will evaluate weather conditions immediately preceding and at the start of the season for potential weather-related delay based on search and rescue criteria. For further information please contact the Alaska Department of Fish and Game in Dutch Harbor at (907) 581-1239.

-end-

ALASKA DEPARTMENT OF FISH AND GAME
COMMERCIAL FISHERIES
NEWS RELEASE

Kevin Duffy, Commissioner

Doug Mecum, Director
Division of Commercial Fisheries
Juneau

Contact: Forrest R. Bowers
Area Management Biologist
Bering Sea/Aleutian Islands

Westward Region
211 Mission Road
Kodiak, AK 99615

Division of Commercial Fisheries
Phone: (907) 581-1239
Fax: (907) 581-1572

Date: October 17, 2004
9:00 PM

CLOSURE OF THE BRISTOL BAY RED KING CRAB FISHERY

The Alaska Department of Fish and Game announces closure of the Bristol Bay red king crab fishery at 11:59 PM, Monday, October 18, 2004. This closure applies to all vessels, including those participating in the American Fisheries Act cooperative fishery.

Voluntary catch reports from approximately 23% of the fleet indicate that 7.63 million pounds of red king crabs have been harvested to date. Reports through 6:00 PM October 17, 2004 indicate that the general fishery guideline harvest level of 14.267 million pounds of red king crabs will be reached by the fishery closure at 11:59 PM, October 18, 2004.

This announcement provides the fleet with more than 24 hours advance notice of the closure, thus the fleet must have all gear unbaited and stored with the doors open or removed from the water at the time of the closure. All gear must be placed in legal wet storage or removed from the water within 10 days of the closure.

Following the fishery closure, vessels delivering to Dutch Harbor, Akutan or King Cove must be at their delivery location within 30 hours. Vessels delivering to Adak, Saint Paul or ports east of King Cove are required to contact the Alaska Department of Fish and Game in Dutch Harbor prior to exiting Area T, and provide information regarding final delivery destination, number of crabs on board and estimated time of arrival.

For further information, contact the Alaska Department of Fish and Game in Dutch Harbor at (907) 581-1239.

ALASKA DEPARTMENT OF FISH AND GAME
COMMERCIAL FISHERIES
NEWS RELEASE

Kevin Duffy, Commissioner

Doug Mecum, Director
Division of Commercial Fisheries
Juneau

Contact: Barbi Failor-Rounds
CDQ/Groundfish Management Biologist
Bering Sea/Aleutian Islands

Westward Region
211 Mission Road
Kodiak, AK 99615

Division of Commercial Fisheries
Phone: (907) 581-1239
Fax: (907) 581-1572

Date: October 22, 2004

CDQ ALLOCATION FOR THE 2004 BRISTOL BAY RED KING CRAB FISHERY

Preliminary harvest for the 2004 Bristol Bay red king crab general fishery, based on production records and hailed weights, is 13.9 million pounds. The final harvest total will be available October 27, 2004 and is not expected to deviate significantly from this estimate.

The 2004 Bristol Bay red king crab CDQ allocation is 7.5 percent of the total harvest of Bristol Bay red king crab. The total harvest is defined as the general fishery harvest plus the CDQ harvest. The CDQ allocation based on the above preliminary harvest amount is 1,127,027 pounds. The individual group allocations are as follows:

Group	Allocation
APICDA	191,594 pounds
BBEDC	214,135 pounds
CBSFA	112,703 pounds
CVRF	202,865 pounds
NSEDC	202,865 pounds
YDFDA	202,865 pounds

These allocations may be amended once the final harvest total is available. The CDQ groups are to manage their fishing efforts in a manner not to exceed their allocation.

For further information, contact the Alaska Department of Fish and Game in Dutch Harbor at (907) 581-1239.

ALASKA DEPARTMENT OF FISH AND GAME
COMMERCIAL FISHERIES
NEWS RELEASE

Kevin Duffy, Commissioner

Doug Mecum, Director
Division of Commercial Fisheries
Juneau

Contact: Karla L. Bush
Assistant Area Management Biologist
Bering Sea/Aleutian Islands

Westward Region
211 Mission Road
Kodiak, AK 99615

Division of Commercial Fisheries
Phone: (907) 581-1239
Fax: (907) 581-1572

Date: November 4, 2004

2005 EASTERN ALEUTIAN DISTRICT TANNER CRAB SEASON

The Alaska Department of Fish & Game has completed analysis of trawl survey results for the Eastern Aleutian District (EAD) Tanner crab stock.

Trawl survey estimates of mature male abundance were used to set threshold levels for areas of historic Tanner crab abundance in the EAD. Thresholds were set at 50% of the long-term mature male abundance and were calculated for Unalaska, Makushin/Skan and Akutan Bays. Threshold levels of abundance must be met prior to a fishery opening. The 2004 estimates of mature male abundance met threshold levels in Akutan, Makushin/Skan and Unalaska Bays. Numbers of recruit and legal-sized male crabs in Akutan Bay have decreased since the 2003 estimates and the calculated GHL did not meet criteria for inseason management. The population of pre-recruit sized male crabs increased 15% from the 2003 estimates and the outlook for future fisheries in the Akutan locale has improved. In Makushin/Skan Bay the abundance of new-shell legal male crabs has doubled since the 2003 survey. This was not unexpected given the large mode of crab centered approximately one molt away from legal size in 2003. The abundance estimates for new-shell legal male crabs in Unalaska Bay has decreased 25% from the 2003 estimates although not all areas fished are included in the trawl survey. Increased recruitment of legal sized male crabs in the Unalaska locale are expected in the next few years. GHLs for the 2005 EAD Tanner crab fishery are as follows:

Locale	GHL
Makushin Bay	171,453 pounds
Unalaska Bay	35,304 pounds
Akutan Bay	Closed

The EAD commercial Tanner crab fishery will open at NOON on January 15, 2005.

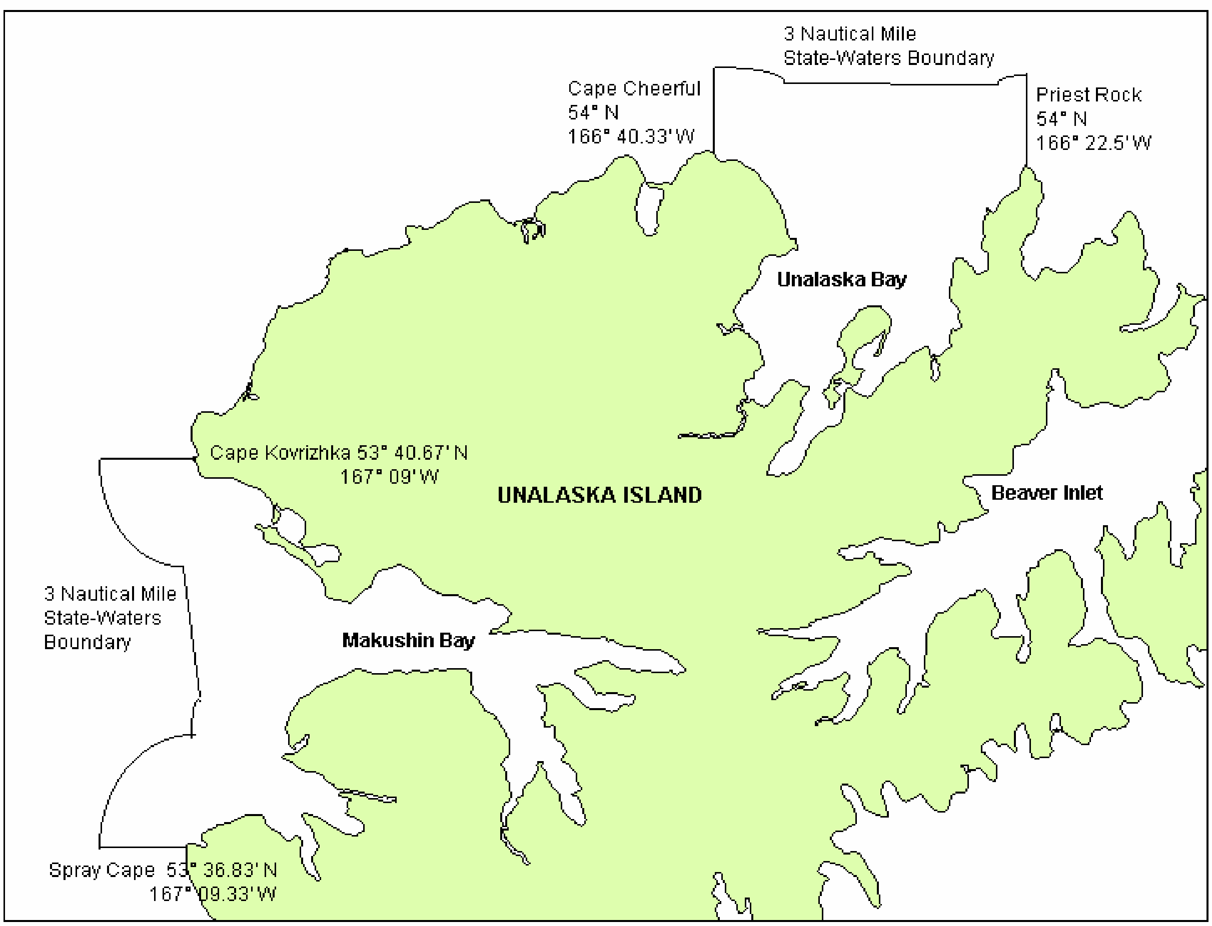
-continued-

A description of the areas open to commercial fishing for Tanner crabs in 2005 is available on the map below. Fishers are reminded that in Unalaska Bay south of a line from Priest Rock to Cape Cheerful, vessels fishing for Tanner crabs are limited to 58 feet or less in overall length.

The preseason registration deadline for the EAD Tanner crab fishery is 5:00 PM December 27, 2004. Preseason registration forms must be received by the department before the deadline. Preseason registration forms are available at the Dutch Harbor office or on the World Wide Web at http://www.cf.adfg.state.ak.us/region4/shellfsh/crabs/05eadtanner_form.pdf or via fax upon request. A 2004 or 2005 T09O or T91O Commercial Fisheries Entry Commission permit card listing the vessel's ADF&G number is required at the time of preseason registration. The web site for vessel operators to verify the state's receipt of vessel preseason registration is http://www.cf.adfg.state.ak.us/region4/shellfsh/crabs/05eadtanner_reg.pdf. This web site is updated several times per week.

The number of vessels preseason registered will be used to establish pot limits for the fishery. Details on pot limits, buoy tag sales and fishery management will be available in a news release occurring shortly after the preseason registration deadline.

Description of areas open to commercial Tanner crab fishing in the Eastern Aleutian District in 2005:



For further information, contact the Alaska Department of Fish and Game in Dutch Harbor at (907) 581-1239.

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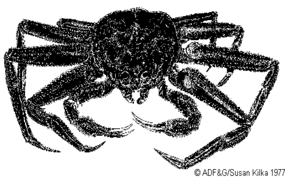

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Kevin Duffy, Commissioner

Doug Mecum, Director
Division of Commercial Fisheries
Juneau

Contact: Mary Schwenzfeier
Shellfish Observer Program Coordinator
Dutch Harbor

Westward Region
211 Mission Road
Kodiak, AK 99615

Division of Commercial Fisheries
Phone: (907) 581-1239
Fax: (907) 581-1572

December 26, 2003

Catcher Vessels Selected for Observer Coverage
2004 Bering Sea Snow Crab Fishery

The following catcher vessels, randomly selected from the 2004 Bering Sea snow crab fishery pre-season vessel registrations, will carry crab observers for the duration of the general fishery:

Vessels 75 feet to 125 feet

Vessel Name	ADF&G #
Keta	07189
Controller Bay	72847
Kevleen K	00960
Aleutian Ballad	46553
Early Dawn	00103
Cascade Mariner	00064
Atlantico	00037
Arctic Wind	01112
Bering Sea	00052
Ramblin' Rose	59686
Kirsten Marie	00022
Zone Five	61718
Alternates	
Destination	42234
Andronica	39926

Vessels greater than 125 feet

Vessel Name	ADF&G #
Husky	00964
Labrador	12128
Lady Alaska	61351
Arctic Baruna II	68870
Karin Lynn	00524
Exito	54956
Alternates	
Northwestern	29962
Kodiak Queen	06459

-continued-

ADF&G or a state-contracted observer company will provide observers for the selected catcher vessels. The observer must be on the selected vessel on or before January 13, the time of vessel registration validation. By regulation, vessels that carry observers must provide proof of compliance with United States Coast Guard (USCG) vessel safety requirements. USCG dockside examinations are available in Puget Sound, Kodiak and Dutch Harbor.

Observer salary and travel costs for catcher vessels participating in the general fishery will be provided from cost-recovery funds.

Observers will have their own rain gear, boots, gloves, survival suit and personal flotation device (PFD) for working on deck, along with their own bedding and personal items. Some of the regulatory requirements for vessels that carry observers include:

- Provide adequate food and accommodations for the observer equal to those provided for the vessel's crew;
- Provide to the observer daily catch information, including areas fished, number of crab retained, number of pots pulled, and other information specified by the department;
- Provide a safe work area, and necessary gear such as 3 to 4 totes for the observer to use at all times to hold the contents of crab pots for sampling;
- Assure observer access to single side band (SSB) radio, fax, telex, or telephone so that catch reports from observers are received at the Dutch Harbor ADF&G office in a timely manner.

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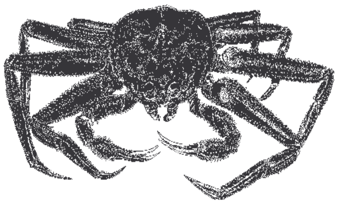

Kevin Duffy, Commissioner

Doug Mecum, Director
Division of Commercial Fisheries
Juneau

Contact: Denby S. Lloyd
Regional Supervisor

Westward Region
211 Mission Road
Kodiak, AK 99615

Division of Commercial Fisheries
Phone: (907) 486-1825
Fax: (907) 486-1841

Date: December 27, 2004

ADF&G ANNOUNCES FISHERY CLOSURES SURROUNDING THE *SELENDANG AYU* OIL SPILL

The Alaska Department of Fish & Game (ADF&G) and the Alaska Department of Environmental Conservation (ADEC) are working with the *Selendang Ayu* oil spill Unified Command and subcontractors to determine the extent of oiling in the area along the western shore of Unalaska Island. Information is being collected to determine location of oil onshore, in the water, and if oil will likely contact fishing gear and fishery resources.

The State of Alaska has a "Zero Tolerance Policy" with respect to oil contamination of seafood. If ADEC finds that an oil spill threatens to contaminate a body of water or management area, fishing vessels, tenders, and seafood processors must be inspected before, during, and after conducting fishing activities or receiving seafood products (18 AAC 34.600-625). Moreover, under authority of AS 16.05.060, the Department of Fish and Game will close fisheries in areas where there is a likely threat of contamination.

Based on information collected to date, undetermined amounts of oil are present in the Makushin and Skan Bay areas. Because oil is present and poses a threat of contamination to fishing gear, fishery resources, and potential fishery harvests, effective at 12:01 AM January 1, 2005, the department will close state-waters between Cape Kovrizhka (53 degrees, 50.67 minutes N lat.; 167 degrees, 09 minutes W long.) and Spray Cape (53 degrees, 36.83 minutes N lat.; 167 degrees, 09.33 minutes W long.) to all commercial fishing.

Closure of this area will specifically affect that portion of the upcoming Eastern Aleutian District Tanner crab (*C. bairdi*) fishery planned for the Makushin/Skan Bay area beginning January 15, 2005. Also closed will be fishing in these state waters for Pacific cod, black rockfish and other groundfish species that would otherwise have been open on January 1, 2005. The Makushin/Skan Bay area will remain closed to all commercial fishing until further notice, pending monitoring and assessment indicating that the threat of contamination is eliminated. The closed area may be enlarged if the threat of contamination expands to adjacent bays and fishing grounds.

However, given the observed, limited distribution of oil to areas in the vicinity of the *Selendang Ayu*, there is as yet no apparent need to close that portion of the Eastern Aleutian District Tanner crab fishery planned for state waters of Unalaska Bay. Therefore, unless conditions change, that portion of the fishery will open as scheduled at NOON on January 15, 2005, with a guideline harvest level of 35,304 pounds. The fishery-wide pot limit of 300 pots will apply, as does the previously announced preseason registration deadline of 5:00 PM December 27, 2004.

The department currently has no plans to close or delay the Bering Sea snow crab (*C. opilio*) fishery scheduled to open on January 15, 2005. The snow crab resource and fishing grounds are substantially distant from the spill-impacted area. If the extent of oil contamination increases to threaten areas near or including fishing grounds for snow crab, or transit routes from the grounds to shoreside and floating processors, a subsequent closure, delay, or modification of the fishery may result.

Waters of the Port of Dutch Harbor and Unalaska Bay will be closely monitored. These waters support several local fisheries and are important transit and offloading areas for many vessels and seafood processors. While at this time no fishery closures for Unalaska Bay are announced, a threat of oil contamination in the area may also result in subsequent restrictions.

For up-to-date information on the *Selendang Ayu* oil spill, visit http://www.state.ak.us/dec/spar/perp/response/sum_fy05/041207201/041207201_index.htm

-end-

ALASKA DEPARTMENT OF FISH AND GAME
COMMERCIAL FISHERIES
NEWS RELEASE

Kevin Duffy, Commissioner

Doug Mecum, Director
Division of Commercial Fisheries
Juneau

Contact: Karla L Bush
Assistant Area Management Biologist
Bering Sea / Aleutian Islands

Westward Region
211 Mission Road
Kodiak, AK 99615

Division of Commercial Fisheries
Phone: (907) 581-1239
Fax: (907) 581-1572

Date: December 27, 2004
3:00 PM

CLOSURE OF ALEUTIAN ISLANDS GOLDEN KING CRAB FISHERY WEST OF 174° W LONGITUDE

The Aleutian Islands (Area O) opened to commercial fishing for golden king crabs on August 15, 2004 with guideline harvest levels (GHL) of 3.0 million pounds east and 2.7 million pounds west of 174° W long. That portion of Area O east of 174° W long., closed to commercial fishing on August 29, 2004. Fishing effort west of 174° W long., has fluctuated throughout the season from two to six vessels; currently three vessels are participating. Weekly harvest has ranged from 16,000 to 227,000 pounds per week and has averaged 139,000 pounds per week. Through December 25, 2004, approximately 2.59 million pounds of golden king crabs have been harvested from Area O west of 174° W long., and at the current harvest rate, the GHL of 2.7 million pounds will be reached by NOON Monday, January 3, 2005. Therefore, the Aleutian Islands golden king crab fishery west of 174° W long. will close to commercial fishing at 12:00 NOON Monday, January 3, 2005.

All golden king crab pots in Area O west of 174° W long., must be unbaited and have doors secured fully open by the time of the closure. Given fleet distribution during the 2004/05 fishery and distance from the most westerly grounds in the registration area to delivery locations in the eastern Aleutian Islands, landing requirements have been extended. Fishers delivering golden king crabs to processors in Dutch Harbor or Akutan must be at their delivery location within 96 hours of the closure. Fishers delivering golden king crabs to King Cove or points east of King Cove may request additional time to reach those ports.

For further information, contact the Alaska Department of Fish and Game in Dutch Harbor at (907) 581-1239.

ALASKA DEPARTMENT OF FISH AND GAME
COMMERCIAL FISHERIES
NEWS RELEASE

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Kevin Duffy, Commissioner

Doug Mecum, Director
Division of Commercial Fisheries
Juneau

Contact: Forrest R. Bowers
Area Management Biologist
Bering Sea / Aleutian Islands

Westward Region
211 Mission Road
Kodiak, AK 99615

Phone: (907) 581-1239
Fax: (907) 581-1572

Date: December 29, 2004

EASTERN ALEUTIAN DISTRICT *C. BAIRDI* TANNER CRAB FISHERY POT LIMIT AND VESSEL REGISTRATION

The Unalaska Bay portion of the Eastern Aleutian District Tanner crab fishery will open at noon on January 15, 2005 with a guideline harvest level of 35,304 pounds. The minimum size limit is 5.5 inches carapace width and only male crabs may be retained. The area opened to fishing is defined at those waters of Unalaska Bay west of Priest Rock (54° N lat., 166° 22.5' W long.) and east of Cape Cheerful (54° N lat., 166° 40.33' W long.) to the three nautical mile state-waters boundary. A map of the Unalaska Bay area open to fishing can be found attached to the ADF&G news release dated 11/04/04. Note that those waters of Makushin and Skan Bays previously announced to open will remain closed.

Fishers are reminded that in Unalaska Bay south of 54° N lat., vessels fishing for Tanner crabs are limited to 58 feet or less in overall length. In addition, a person or vessel that operates commercial, subsistence, sport, or personal use pots during the 14 days immediately before the opening of the commercial Tanner crab season, may not participate in the commercial Tanner crab fishery in the Tanner crab registration area where the fishing with pots occurred, according to 5 AAC 35.053 OPERATION OF OTHER POT GEAR (1).

Eastern Aleutian District *C. bairdi* Tanner crab fishery preseason registrations were received from 54 vessels by the 5:00 PM December 27, 2004 deadline. Based on the 54 preseason vessel registrations and the fishery limit of 300 pots, the vessel pot limit for the 2005 Eastern Aleutian District *C. bairdi* Tanner crab fishery is set at 5 pots per vessel. Buoy tags for the fishery will be available for sale in Dutch Harbor beginning December 28, 2004 for $2.00 each. ADF&G cautions that buoy tags are not designed to withstand the stress of being run through the crab block or similar stress during gear operations. Buoy tags should be secured on the main or trailer buoy in a manner minimizing handing stress.

Vessel registrations and tank inspections will be available in Dutch Harbor beginning at noon on January 14, 2005. "Quick registration" tank inspections prior to gear loading will be available beginning January 10, 2005 and fishers are reminded that all gear onboard the vessel must meet all specifications in regulation including biodegradable escape mechanisms and escape rings or large mesh according to 5 AAC 35.525 LAWFUL GEAR FOR REGISTRATION AREA J (e). A holder of a 2005 T91O or T09O interim use permit must be onboard the vessel at the time of registration.

For additional information, please contact the Alaska Department of Fish and Game in Dutch Harbor (907-581-1239).

-end-

Stock Assessment of eastern Bering Sea snow crab

Benjamin J. Turnock and Louis J. Rugolo
National Marine Fisheries Service

SUMMARY

A size based model was developed for eastern Bering Sea snow crab (*Chionoecetes opilio*) to estimate population biomass and harvest levels. Model estimates of mature biomass of snow crab increased from the early 1980's to a peak in 1990 of about 2,418 million lbs. Biomass declined in the late 1990's to about 938 million lbs. in 1999. The stock was declared overfished in 1999 because the survey estimate of mature biomass was below the minimum stock size threshold (MSST = 460 million lbs). A rebuilding plan was implemented in 2000. Despite the imposition of the rebuilding plan, model estimates of mature biomass continued to decline to 609 million lbs in 2004, then increased slightly to 678 million lbs in 2005. Survey biomass estimates were lower in the mid-1980's than current survey estimates, however, model estimates in the last four years have been at historic lows. Survey biomass is higher in 2005 from an apparent medium size recruitment in 2004 that can be seen in the 2004 and 2005 survey data. More data is needed to verify the strength of this recruitment, as some apparent recruitments in the past have not followed through to large size crab.

Catch has followed survey abundance estimates of large males, since the survey estimates have been the basis for calculating the GHL (Guideline Harvest Level for retained catch). Retained catches increased from about 6.7 million lbs at the beginning of the directed fishery in 1973 to a peak of 328 million lbs in 1991, declined thereafter, then increased to another peak of 243 million lbs in 1998. Retained catch in the 2000 fishery was reduced to 33.5 million lbs due to the low abundance estimated by the 1999 survey. A harvest strategy was developed using a simulation model previous to the development of the current model (Zheng et al. 2002), that has been used to set the most recent GHL's. Retained catch in the 2004 fishery was 23.66 million lbs, about 14% above the GHL of 20.8 million lbs. The 2004 total catch (retained plus discard) was estimated at 27.54 million lbs. Retained catch in the 2005 fishery was about 25 million lbs, about 20% above the GHL of 20.9 million lb.

Estimated discard (mostly undersized males and old shell males) in the directed pot fishery has averaged about 33% of the retained catch biomass since 1992 when observers

were first placed on crab vessels. Discards prior to 1992 were estimated based on fishery selectivities estimated for the period with observer data.

Two model scenarios were run for this stock assessment. Estimates of Fmsy, Bmsy and the resulting catch estimates depend on the model scenario used, the steepness and R0 (recruitment that occurs with no fishing) parameters of the spawner recruit curve, assumptions concerning size and shell condition of males that take part in mating, and the mating ratio (number of females that each mature male in the reproductive stock can fertilize in one mating season).

Using the 50% discard mortality scenario, the 2006 total effective spawning biomass at mating time(TESB) is projected to be at 38% of Bmsy. Using the estimated reference points and the Fmax =0.75*Fmsy harvest control rule, the target total catch (retained plus discard mortality) for the 2006 season is estimated at 13.6 million lbs and the 2006 retained catch is estimated at 9.9 million lbs (F=0.225). The target total catch (retained plus discard mortality) for the 2006 season fishing at the Fmsy harvest control rule, is estimated at 17.6 million lbs and the 2006 retained catch is estimated at 12.7 million lbs. The 2006 retained catch for the 100% discard mortality scenario is 6.7 million lbs, with 2006 TESB estimated at 32% of Bmsy.

The 2006 retained catch using the current harvest strategy with mature male survey biomass (295 million lbs) is estimated at 31 million lbs (F=0.77), well above (140% or 2.4 times) the 2006 catch of 12.7 million lbs estimated using the Fmsy control rule. The exploitation rate cap of 58% on the new shell males >101 plus 25% of old shell males >101 mm estimated from the survey (at the time of the survey) resulted in a lower 2006 catch than estimated using mature male survey biomass alone. Although the total number of males >101mm estimated from the survey in 2005 (69 million) is similar to the estimate in 2004, only 51% were new shell in 2005. Total catch (retained plus discard mortality) is estimated at 37 million. lbs (assuming discard losses are 33% of retained catch and 50% discard mortality). If the current harvest strategy assumes 25% discard mortality, which results in a total catch of 34 million. lbs.

Exploitation rates in the southern portion of the range of snow crab have been higher than target rates estimated using abundances in the geographic distribution of the stock due the majority of catch occurring in the southern portion of the snow crab range. This prominent feature of the fishery for Bering Sea snow crab has possibly contributed to the shift in distribution to less productive waters in the north. Computing the catch based on the complete survey biomass results in exploitation rates higher than the target rate on crabs in the southern area of the distribution. One solution would be to split the catch into two regions, north and south, according to the percent distribution of the survey estimate of large males or mature males from those regions. This would require knowing the location of catch inseason. Two other approaches would not require knowledge on inseason catch location. One would be to compute the catch from that portion of the stock where most of the catch is extracted. Another approach would be to compute a catch that would result in the target harvest rate for the southern portion of the stock and increase that catch according to the percent catch in the north. Splitting the catch by area would result in about 28% of the catch south of 58.5 deg N and 72% north. In 2003 and 2004, 26% and 24% respectively of male biomass greater than 101 mm measure in the survey was south of 58.5 deg N. Accounting for the population distribution and catch distribution would result in an expected exploitation rate in the southern portion of the snow crab range closer to the target rate.

Simulations to project biomass and evaluate rebuilding were conducted using several alternative harvest control rules, and the current harvest strategy. Biomass is expected to increase in the next few years due to recent higher recruitment. The amount of increase may change in future assessments as more data on the strength of the 2003-2004 recruitments is obtained.

Rebuilding to Bmsy from the current stock condition under F=0 was 5 years, versus 30 years under the Fmax=0.75*Fmsy harvest strategy. The mean generation time for snow crab was estimated at 9.7 years, resulting in a maximum time to rebuild (Tmax) of 14.7 years. Rebuilding in 15 years would require a control rule with a maximum fishing mortality of 0.4*Fmsy. The lower fishing mortality would result in initially lower catches during rebuilding. Rebuilding is projected to not occur under the current harvest strategy, which results in fishing mortality values greater than the Fmsy control rule in most years, and notably higher rates on the southern stock component targeted by the fishery.

Estimated fishing mortality rates from the 1980 fishing season to 2005 have been above the Fmsy control rule except for two years (1983 and 1984). The F rate targeted historically (pre-2000 fishery season) was about 1.1, which was exceeded in many years. The last two fishery seasons F was estimated at 0.48 and 0.55, above the Fmsy control rule estimated in this analysis.

INTRODUCTION

Snow crab (*Chionoecetes opilio*) are distributed on the continental shelf of the Bering Sea, Chukchi Sea, and in the western Atlantic Ocean as far south as Maine. In the Bering Sea, snow crab are common at depths less than about 200 meters. The eastern Bering Sea population within U.S. waters is managed as a single stock, however, the distribution of the population may extend into Russian waters to an unknown degree.

CATCH HISTORY

Snow crab were harvested in the Bering Sea by the Japanese from the 1960s until 1980 when the Magnuson Act prohibited foreign fishing. Retained catch in the domestic fishery increased in the late 1980’s to a high of about 328 million lbs in 1991, declined to 65 million lbs in 1996, increased to 243 million lbs in 1998 then declined to 33.5 million lbs in the 2000 fishery (Table 1, Figure 1). Due to low abundance and a reduced harvest rate, retained catches remained low and were 32.7 million lbs in the 2002 fishery (36.2 million lbs total catch), 28.3 million lbs of retained catch in 2003 (39 million lbs total catch), and 23.66 million lbs of retained catch in 2004 (27.54 million lbs total catch). Retained catch in the 2005 fishery was 26 million lbs.

Discard from the directed pot fishery was estimated from observer data since 1992 and ranged from 11% to 64% (averaged about 33%) of the retained catch of male crab biomass (Table 1). Female discard catch is very low and not a significant source of mortality. In 1992 trawl discard mortality was about 9 million lbs, then declined to about 2 to 3 million lbs until 1998, when it declined to below 1 million lbs. Most discard for the period 1997 to 2002 in groundfish fisheries came from the yellowfin sole trawl fishery, flathead sole trawl fishery, Pacific cod bottom trawl fishery, rock sole trawl fishery and the pacific cod hook and line and pot fisheries in decreasing order of catch.

Size frequency data and catch per pot have been collected by observers on snow crab fishery vessels since 1992. Observer coverage was 10% on catcher vessels larger than 125 ft (since 2001), and 100% coverage on catcher processors (since 1992). In the 2002 fishery about 0.5% of the total pot lifts were observed (Neufeld and Barnard 2003).

The average size of retained crabs has remained fairly constant over time ranging between 105 mm and 118 mm, and most recently about 110 mm to 111 mm. The percent new shell animals in the catch has varied between 69% (2002 fishery) to 98% (1999), and was 95% to 98% for 1997 to 2001 fisheries. The average weight of retained crab has varied between 1.1 lbs (1983-1984) and 1.6 lbs(1979), and 1.3 lbs in the 2002 fishery.

Several modifications to pot gear have been introduced to reduce bycatch mortality. In the 1978/79 season, pots used in the snow crab fishery first contained escape panels to prevent ghost fishing. Escape panels consisted of an opening with one-half the perimeter of the tunnel eye laced with untreated cotton twine. No escape mechanisms for undersized crab were required until the 1997 season when at least one-third of one vertical surface had to contain not less than 5 inches stretched mesh webbing or have no less than four circular rings of no less than 3 3/4 inches inside diameter. In the 2001 season the escapement for undersize crab was increased to at least eight escape rings of no less than 4 inches placed within one mesh measurement from the bottom of the pot, with four escape rings on each side of the two sides of a four-sided pot, or one-half of one side of the pot must have a side panel composed of not less than 5 1/4 inch stretched mesh webbing. The size of the cotton laced panel to prevent ghost fishing was increased in 1991 to at least 18 inches in length.

ABUNDANCE AND EXPLOITATION TRENDS

Survey Biomass

Abundance is estimated from the annual Bering Sea bottom trawl survey conducted by NMFS (see Rugolo et al. 2003 for design and methods). Since 1989, the survey has sampled stations farther north than previous years. In 1982 the survey net was changed resulting in a change in catchability. Juvenile crabs tend to occupy more inshore northern regions (up to about 63 degrees N) and mature crabs deeper areas to the south of the juveniles (Zheng et al. 2001).

The total mature biomass estimated from the survey declined to a low of 185 million lbs in 1985, increased to a high of 1,632 million lbs in 1991, then declined to 310 million lbs in 1999, when the stock was declared overfished (Table 2 and Figure 2). The mature biomass increased in 2000 and 2001, mainly due to a few large catches of mature females. The 2003, 2004 and 2005 survey estimates of total mature biomass were 304 million lbs, 358 million lbs, and 505 million lbs, respectively. The total mature biomass includes all sizes of mature females and morphometrically mature males.

The term mature for male snow crab will be used here to mean morphometrically mature. Morphometric maturity for males refers to a marked change in chelae size (thereafter termed “large claw”), after which males are assumed to be effective at mating. Males are functionally mature at smaller sizes than when they become morphometrically mature, although the contribution of these “small-clawed” males to annual reproductive output is negligable. The size at 50% for morphometric maturity was estimated at 88 mm. The size at 50% functional maturity has not been estimated, however is less than 88 mm. The minimum legal size limit for the snow crab fishery is 78 mm, however the size for males that are generally excepted by the fishery is >101mm. The historical quotas were based on the survey abundance of large males (>101mm).

Harvest rates

The Harvest rate used to set the GHL (Guideline harvest level of retained crab only) previous to 2000 was 58% of the number of male crab over 101 mm carapace width estimated from the survey (Anonymous, 2000). The minimum legal size limit for snow crab is 78 mm, however, the snow crab market generally accepts animals greater than 101 mm. In 2000, due to the decline in abundance and the declaration of the stock as overfished, the harvest rate for calculation of the GHL was reduced to 20% of male crab over 101 mm. After 2000, a harvest strategy was developed based on simulations by Zheng (2002).

The actual retained catch typically exceeds the GHL, resulting in exploitation rates for the retained catch (using survey numbers) ranging from about 60% to 100% for most years (Figure 3). The actual exploitation fraction is calculated using the abundance for male crab over 101 mm estimated from the survey data reduced by the natural mortality from the time of the survey until the fishery occurs, approximately 7 months later, since the late 1980’s. The historical GHL calculation did not include the correction for time lapsed between the survey and the fishery. Catches were greater than the abundance estimates from the survey because some crabs are retained that are less than 102 mm, discard mortality of small crabs is also included, and survey catchability may be less than 1.0. The exploitation fraction using the total catch divided by the mature male biomass estimated from the model, ranged from 10% to 50% (Figure 4). The exploitation fraction estimated by dividing the total catch by the model estimate of the crabs over 101 mm ranged from about 15% to 80% (Figure 4). The total exploitation rate on males > 101 mm was 50% to 75% for 1986 to 1994 and near 70% for 1998 and 1999 (year when fishery occurred).

Bmsy (921.6 million lbs) is defined in the current crab FMP as the average total mature biomass (males and females) estimated from the survey for the years 1983 to 1997 (BSAI crab FMP 1998). MSST was defined as 50% of the Bmsy value (MSST=460 million lbs of total mature biomass). The current harvest strategy uses a retained crab harvest rate on the mature male biomass of 0.10 on levels of total mature biomass greater than ½ MSST (230 million lbs), increasing linearly to 0.225 when biomass is equal to or greater than Bmsy (921.6 million lbs) (Zheng 2002). The GHL is actually set as the number of retained crab allowed in the harvest, calculated by dividing the GHL in lbs by the average weight of a male crab > 101 mm. If the GHL in numbers is greater than 58% of the estimated number of new shell crabs greater than 101 mm plus 25% of the old shell crab greater than 101 mm, the GHL is capped at 58%. If natural mortality is 0.2, then this actually results in a realized exploitation rate cap for the retained catch of 66% at the time of the fishery, occurring approximately 7 months after the survey. The fishing mortality rate that results from this harvest strategy depends on the relationship between mature male size numbers and male numbers greater than 101 mm. The maximum full selection fishing mortality rate is close to 1.0 under the current harvest strategy at the maximum harvest rate of 0.225 of mature male biomass.

Survey Size Composition

Carapace width is measured on snow crab and shell condition noted in the survey and the fishery. Snow crab cannot be aged at present (except by radiometric aging of the shell since last molt), however, shell condition has been used as a proxy for age. Based on protocols adopted in the NMFS EBS trawl survey, shell condition class and presumptive age are as follows: soft shell (SC1) (less than three months from molting), new shell (SC2) (three months to less than one year from molting), old shell (SC3) (two years to three years from molting), very old shell (SC4) (three years to four years form molting), and very very old shell (SC5) (four years or longer from molting). Radiometric aging of shells from terminal molt male crabs (after the last molt of their lifetime) elucidated the relationship between shell condition and presumptive age, which will be discussed in a later section (Nevissi et al 1995 and Orensanz unpub. Data).

Survey abundance by size for males and females indicate a moderate recruitment of small crab in 2004 and 2005 (Figures 5 and 6). High numbers of small crab in the late 1970’s did not follow through the population to the mid-1980’s. The high numbers of small crab in the late 1980’s resulted in the high biomass levels of the early 1990’s and subsequent high catches. Moderate increase in numbers can also be seen in the mid 1990’s.

Spatial distribution of catch and survey abundance

In 2003 and 2004, the majority of the fishery catch occurred south of 58.5 deg N., even though ice cover did not restrict the fishery moving farther north. In past years, most of the fishery catch occurred in the southern portion of the snow crab range possibly due to ice cover and proximity to port and practical constraints of meeting delivery schedules. In 2003, 66% of the catch was south of 58.5 deg N. (Figure 7), and in 2004 78% of the catch was south of 58.5 deg N. (Figure 8). In 2003 and 2004 the ice edge was farther north than past years, allowing some fishing to occur as far north as 60-61 deg N.

Summer survey data show that approximately 75% of the mature male snow crab population resides in a region outside of the fishery zone (north of 58.5 deg N Latitude). The 2003 survey estimated about 24% of the male snow crab >101mm were south of 58.5 deg N. About 48% of those males were estimated to be new shell. In 2004 about 26 % of the survey abundance of male snow crab > 101 mm and the mature male biomass were south of 58.5 deg N. latitude (Figures 9 and 11). About 53% of those males south of 58.5 deg N. were estimated to be new shell (which are preferred by the fishery). The 2004 fishery retained about 19 million crab of which about 14.8 million were caught south of 58.5 deg south (about 78%). At the time of the fishery, although these new shell males are morphometrically mature (i.e., large clawed), they are subject to exploitation prior recruiting to the reproductive stock – i.e., mating once. The 2003 survey estimate of new shell male crab > 101 mm was about 7.6 million south of 58.5 deg N. which would have been fished on in the 2004 fishery. In the 2004 survey about 9.5 million new shell males >101mm were estimated south of 58.5 deg N. This indicates that survey catchability may be less than 1.0 and/or some movement occurs between the summer survey and the winter fishery. However, the exploitation rate on males south of 58.5 deg N exceeds the target rate, possibly resulting in a depletion of males from the southern part of their range. Snow crab larvae probably drift north and east after hatching in spring. Snow crab appear to move south and west as they age, however, no tagging studies have been conducted to fully characterize the ontogenetic or annual migration patterns of this stock. High exploitation rates in the southern area may have resulted in a northward shift in snow crab distribution. Lower egg production in the south from lower clutch fullness and higher percent barren females possibly due to insufficient males for mating may drive a change in distribution to the north. The northward shift in mature females is particularly problematic in terms of annual reproductive output due to lowered productivity from the shift to biennial spawning of animals in waters < 1.5 deg C in the north. The lack of males in the southern areas at mating time (after the fishery occurs) may result in insufficient males for mating.

The spatial distribution of snow crab in the 2005 survey was similar to 2004 (Figures 9 through 14). Female crab > 49 mm occurred in higher concentration in generally three areas, just north of the Pribilof Islands, just south and west of St. Matthews Island, and to the north and west of St. Matthew Island. Males > 78 mm were distributed in similar areas to females, except the highest concentrations were between the Pribilof Islands and St. Matthews Island.

Armstrong and Ernst (in press) found the centroids of survey summer distributions have moved to the north over time (Figures 15 and 16). In the early 1980's the centroids of mature female distriubution were near 58.5 deg N, in the 1990's the centroids were about 59.5 deg N. The centroids of old shell male distribution was south of 58 deg N in the early 1980's, moved north in the late 1980's and early 1990's then shifted back to the south in the late 1990's (Figure 16). The distribution of males>101 mm was about at 58 deg N in the early 1980's, then was farther north (58.5 to 59 deg N) in the late 1980's and early 1990's, went back south in 1996 and 1997 then has moved north with the centroid of the distribution in 2001 just north of 59 deg N.(Figure 16). The centroids of the catch are generally south of 58 deg N, except in 1987 (Figure 16). The centroids of catch also moved north in the late 1980's and most of the 1990's. The centroids of the catch were about at 56.5 deg N in 1997 and 1998, then moved north to above 58.5 deg in 2002.

ANALYTIC APPROACH

Data Sources

Catch data and size frequencies of retained crab from the directed snow crab pot fishery from 1978 to the 2005 season were used in this analysis. Observers were placed on directed crab fishery vessels starting in 1990. Size frequency data on the total catch (retained plus discarded) in the directed crab fishery were available from 1992 to 2005. However, the overall rate of observer coverage is low for this fishery – e.g., 0.5% of total snow crab pot lifts were observed in 2002 (Neufeld and Barnard 2003). Total discarded catch was estimated from observer data from 1992 to 2005(Table 1). The discarded male catch was estimated for 1978 to 1991 in the model using the estimated fishery selectivities based on the observer data for the period 1992 to 2005. The discard catch estimate was multiplied by the assumed mortality of discards from the pot fishery. Two model scenarios are presented here, one with mortality of discarded crab assumed to be 50% and one with mortality assumed to be 100%. The current harvest strategy assumes a discard mortality of 25% (Zheng 2002). The discard mortality assumptions will be discussed in a later section. The estimated discards previous to 1992 may be underestimates due to the lack of escape mechanisms for undersized crab in the pots prior to 1997.

The following table contains the various data components used in the model,

Data component	Years
Retained male crab pot fishery size frequency by shell condition	1978-2005 (Year when fishery actually occurred)
Discarded male and female crab pot fishery size frequency	1992-2005
Trawl fishery bycatch size frequencies by sex	1990-2003
Survey size frequencies by sex and shell condition	1978-2005
Retained catch estimates	1978-2005
Discard catch estimates from snow crab pot fishery	1992-2004 from observer data
Trawl bycatch estimates	1973-2003
Total survey biomass estimates and coefficients of variation	1978-2005

Model Structure

The model structure was developed following Fournier and Archibald's (1982) methods, with many similarities to Methot (1990). The model was implemented using automatic differentiation software developed as a set of libraries under C++(ADModel Builder). ADModel Builder can estimate a large number of parameters in a non-linear model using automatic differentiation software extended from Greiwank and Corliss(1991) and developed into C++ class libraries. This software provides the derivative calculations needed for finding the objective function via a quasi-Newton function minimization routine(e.g., Press et al. 1992). The model implementation language (ADModel Builder) gives simple and rapid access to these routines and provides the ability to estimate the variance-covariance matrix for all parameters of interest.

Details of the population dynamics and estimation equations, description of variables and likelihood equations are presented in Appendix A (Tables A.1, A.2 and A.3). The population dynamics equations, incorporating the growth transition matrix and molting probabilities are similar to other size based crab models (Zheng et al. 1995 and 1998). There were a total of 276 parameters estimated in the model (Table A.4) for the 25 year range of data (1978-2002). The 78 fishing mortality parameters (one set for the male catch, one set for the female discard catch, and one set for the trawl fishery bycatch) estimated in the model were constrained so that the estimated catch fit the observed catch closely. There were 51 recruitment parameters estimated in the model, one for the mean recruitment, 25 for females and 25 for males, which were constrained to be similar. There were 55 fishery selectivity parameters, 50 of which were length at 50% selected parameters to allow changing fishery selectivities by year.

Molting probabilities for mature males and females were fixed at 0, i.e., growth ceases at maturity which is consistent with the terminal molt paradigm (Rugolo et al. 2005 and Tamone et al. 2005). Molting probabilities were fixed at 1.0 for immature females and males. The intercept and slope of the linear growth function of postmolt relative to premolt size were estimated in the model using parmeters estimated from growth measurements for Bering sea snow crab as prior distributions (Table A.5). A gamma distribution was used in the growth transition matrix with the beta parameters fixed at 0.75 for male and females.

The model separates crabs into mature, immature, new shell and old shell, and male and female for the population dynamics. The model estimate of survey mature biomass is fit to the observed survey mature biomass time series by sex. The model fits the size frequencies of the survey by new and old shell, immature and mature, and by sex. It also fits the size frequencies for the pot fishery catch by new and old shell and by sex.

Crabs 25 mm CW (carapace width) and larger were included in the model, divided into 22 size bins of 5 mm each, from 25-29 mm to a plus group at 130-135mm. In this report the term size as well as length will be considered synonymous with CW. Recruitment to the model was estimated separately for males and females. Recruits were distributed in the first few size bins using a two parameter gamma distribution with the parameters estimated in the model. Eighty-eight parameters were estimated for the initial population size composition of new and old shell males and females in 1978. Recruitment for males and females was constrained to be similar by adding a penalty to the likelihood. No spawner-recruit relationship was used in the population dynamics part of the model. Recruitments for each year were estimated in the model to fit the data.

The NMFS trawl survey occurs in summer each year, generally in June-July. In the model, the time of the survey is considered to be the start of the year (July), rather than January. The modern directed snow crab pot fishery has occurred generally in the winter months (January to February) over a short period of time. In contrast, in the early years the fishery occurred over a longer time period. The mean time of the fishery weighted by the catch was estimated for each year and the fishing mortality applied all at once at the mean time for that year. Natural mortality is applied to the population from the time the survey occurs until the fishery occurs, then catch is removed. After the fishery occurs, growth and recruitment take place (in spring), with the remainder of the natural mortality through the end of the year as defined above.

Weight - Size

The weight (kg) – size (mm) relationship was estimated from survey data, where weight = a* size^b. Female a= 0.00000253, b=2.56472, male a= 0.00000023, b=3.12948 (Figure 17).

Maturity

Maturity for females was determined by visual examination during the survey and used to determine the fraction of females mature by size for each year. Female maturity was determined by the shape of the abdomen, by the presence of brooded eggs or egg remnants. The average maturity curve which has a 50% value of about 49 mm with a slope of 0.16 (Figure 18), was used in the model to estimate mature female abundance and biomass.

Morphometric maturity for males is determined by chela height measurements, which are available starting from the 1989 survey (Otto 1998). The number of males with chela height measurements has varied between about 3,000 and 7,000 per year. In this report a mature male refers to a morphometrically mature male.

One maturity curve for males was estimated and applied to all years in the model. A two-parameter logistic function fit the fraction mature for larger new shell males well, resulting in size at 50% mature for new shell males of 88 mm CW with a slope of 0.12 (Figure 19). The separation of mature and immature males by chela height at small widths may not be adequately refined given the current measurement to the nearest millimeter. Chela height measured to the nearest tenth of a millimeter (by Canadian researchers on North Atlantic snow crab) shows a clear break in chela height at small and large widths and shows fewer mature animals at small widths than the Bering sea data measured to the nearest millionimeter. Measurements recently taken on Bering sea snow crab chela to the nearest tenth of a millionimeter show a similar break in chela height to the Canadian data (Lou Rugolo et al. 2005).

The average fraction mature for old shell males was used as the maturity curve for all years for old shell males. Maturity for old shell males is zero below 40 mm, increases from 83% at 45 mm to 95% at 115 mm.

Selectivity

Selectivity curves for the retained and total catch were estimated as two-parameter ascending logistic curves. Fishery selectivities for new and old shell males are allowed to change by year by estimating one mean size at 50% selectivity parameter, with deviations for each year from 1978 to 2005. The yearly parameters are constrained by a penalty that results in a smooth trend in the parameters over time (Figures 20 and 21). The probability of retaining crabs by size and shell condition was estimated as an ascending logistic function. The selectivities for the retained catch were estimated by multiplying the retention curve by the selectivities for the retained plus discarded size compositions.

The selectivities for the survey and trawl bycatch were estimated with two-parameter, ascending logistic functions. Survey selectivities were set equal for males and females. Separate survey selectivities were estimated for the period 1978 to 1981, 1982 to 1988, and 1989 to the present. The maximum selectivity was fixed at 1.0. The separate selectivities were used due to the change in catchability in 1982 from the survey net change, and the addition of more survey stations to the north of the survey area after 1988. Survey selectivities have been estimated for Bering Sea snow crab from underbag trawl experiments (Somerton and Otto 1999) (Figure 22). A bag underneath the regular trawl was used to catch animals that escaped under the footrope of the regular trawl, and was assumed to have selectivity equal to 1.0 for all sizes. The selectivity was estimated to be 50% at about 74 mm, 0.73 at 102 mm, and reached about 0.88 at the maximum size in the model of 135 mm.

Growth

Very little information exists on growth for Bering Sea snow crab. Tagging experiments were conducted on snow crab in 1980 with recoveries occurring in the Tanner crab (*Chionoecetes bairdi*) fishery in 1980 to 1982 (Mcbride 1982). All tagged crabs were males greater than 80mm CW, which were released in late may of 1980. Forty-nine tagged crabs were recovered in the Tanner crab fishery in the spring of 1981 of which only 5 had increased in carapace width. It is not known if the tags inhibited molting or resulted in mortality during molting, or the extent of tag retention. One crab was recovered after 15 days in the 1980 fishery, which apparently grew from 108 mm to 123 mm carapace width. One crab was recovered in 1982 after almost 2 years at sea that increased from 97 to 107 mm.

Growth data from 14 male crabs collected in March of 2003 that molted soon after being captured were used to estimate a linear function between premolt and postmolt width (Lou Rugolo unpublished data, Figure 23). The crabs were measured when shells were still soft because all died after molting, so measurements are probably underestimates of postmolt width (Rugolo, pers. com.). Growth appears to be greater than growth of some North Atlantic snow crab stocks (Sainte-Marie 1995). Growth from the 1980 tagging of snow crab was not used due to uncertainty about the effect of tagging on growth. No growth measurements exist for Bering Sea snow crab females. North Atlantic growth data indicate growth is slightly less for females than males.

Growth was modeled using a linear function to estimate the mean width after molting given the mean width before molting (Figure 24),

$$\text{Width}_{t+1} = a + b^* \text{ width}_t$$

The parameters a and b estimated from the observed growth data for Bering sea snow crabs were used as prior means for the growth parameters estimated in the model. Crab were assigned to 5mm width bins using a gamma distribution with mean equal to the growth increment by sex and length bin and a beta parameter (which determines the variance),

$$Gr_{s,l\rightarrow l'} = \int_{l'-2.5}^{l'+2.5} Gamma(\alpha_{s,l}, \beta_s)$$

Where Gr is the growth transition matrix for sex, s and length bin l (premolt size). l' is the postmolt size. The Gamma distribution is,

$$g(x \mid \alpha_{s,l}, \beta_s) = \frac{x^{\alpha_{s,l}-1} e^{-\frac{x}{\beta_s}}}{\beta^{\alpha_{s,l}} \Gamma(\alpha_{s,l})} \quad .$$

Where x is length and alpha and beta are parameters.

Natural Mortality

Natural mortality is an essential control variable in population dynamic modeling, and may have a large influence on derived optimal harvest rates. Natural mortality rates estimated in a population dynamics model may have high uncertainty and it may be correlated with other parameters, and therefore is usually fixed. However, a large portion of the uncertainty in model results (e.g. current biomass), will be attributed to uncertainty in natural mortality, when natural mortality is estimated in the model. The ability to estimate natural mortality in a population dynamics model depends on how the true value varies over time as well as other factors (Fu and Quinn 2000, Schnute and Richards 1995).

Estimation Techniques

Hoenig, 5% Rule and maximum age

In the 2004 snow crab SAFE, natural mortality was assumed to be between 0.2 for males and females. A maximum age of 20 years would result from an M of about 0.21 (Table 5) (Hoenig 1983). A natural mortality of 0.3 would indicate a maximum age of about 14 years (Hoenig 1983). Anthony (1982) proposed that the 95% percentile of age be used to limit the maximum age in yield modeling. This procedure would result in an M of 0.2 for a maximum observed age of 15 years. A natural mortality of 0.3 results in about 5% of animals remaining after 10 yrs of age. Research is currently underway to assess a method using lipofuscin for age determination (Se-Jong, et al. 1999). A maximum age of about 13 years for females and 19 years for males has been hypothesized for North Atlantic snow crab by Comeau, et al (1998) based on size frequency analysis and growth data. Sainte-Marie, et al (1995) estimated an age of about 9 years for a 95 mm male snow crab and 11 years for a 131 mm crab for a different sub-population of Atlantic snow crab than Comeau, et al (1998) using size frequency analysis and growth data. A maximum time at large of 8 years for tag returns of terminally molted mature male snow crab in the North Atlantic has been recorded since tagging started about 1993 (Sainte-Marie, pers. comm.).

Model based

Otto (1998) estimated natural mortality of male snow crab based on survey data and retained catches to be greater than 1.0. The snow crab fishery generally occurs over a short time span, about 7 months after the survey. Otto (1998) overestimates M because the method assumed no time lapse between the survey and the fishery removals (during which natural mortality would be occurring) and no bycatch mortality. Otto (1998) assumed that shell condition is an accurate indicator of age since last molt (new shell less than one year, old shell crabs more than one, but less than two years from molting), and that new and old shell crabs were accurately categorized by shell condition. Radiometric aging and tagging data indicate shell condition is not an accurate measure of shell age (discussed in Maximum post-terminal molt age and shell classification section).

Zheng (unpub) investigated natural mortality of Bering Sea snow crab using a modeling approach, accounting for natural mortality between the time of the survey and the fishery. Estimates of natural mortality ranged from 0.0 to 0.97, depending on assumptions made for molting probabilities, growth per molt and survey selectivities (Zheng unpub.).

Tanner crab

Tanner crab have a similar life history to snow crab and probably have similar longevity. Zheng et al. (1998) estimated natural mortality and bycatch mortality together to be about 0.5 for male and female Bering Sea Tanner crab (*Chionecites bairdi*) in a population dynamics model. He did not estimate bycatch mortality separately, but, natural mortality would have been less than the reported 0.5 value. Somerton (1981) estimated natural mortality for male Tanner crab less than commercial size to be 0.35. M was estimated to be between 0.13 and 0.28 for commercial size male Tanner crab (Somerton 1981).

Maximum age post-terminal molt and shell classification

Crab are classified by shell condition at the time of the survey. SC1 crab are soft shell crab indicating they have recently molted. SC2 crab (new shell) have clean, hard shells. SC3 crab (old shell) show some wear and scratches and encrusting organisms are frequently present. SC4 crab (very old shell) have more wear and growth on the shell and encrusting organisms are almost always present. SC5 (very very old shell) have shells extensively stained and usually with extensive cover of encrusting organisms.

Orensanz (unpub.) used radiometric techniques to estimate shell age from last molt (Table 4). The total sample size was 21 male crabs (a combination of Tanner and snow crab) from a collection of 105 male crabs from various hauls in the 1992 and 1993 NMFS Bering sea survey. Representative samples for the 5 shell condition categories were collected that made up the 105 samples. The oldest looking crab within shell conditions 4 and 5 were selected from the total sample of SC4 and SC5 crabs to radiometrically age (Orensanz, pers comm.). Shell condition 5 crab (SC5 = very, very old shell) had a maximum age of 6.85 years (s.d. 0.58, 95% CI approximately 5.69 to 8.01 years). The average age of 6 crabs with SC4 (very old shell) and SC5, was 4.95 years. The range of ages was 2.70 to 6.85 years for those same crabs. Given the small sample size, crabs older than the maximum age of 7 to 8 years are reasonably expected in the population. Maximum life span defined for a virgin stock is reasonably expected to be longer than these observed maximum ages of exploited populations.

Male snow crab during the mid to late 1980's were subjected to increasing exploitation with the maximum catch occurring in 1991. The maximum age in the sample of 6.85 years would be the result of fishing mortality as well as natural mortality. Using this maximum age would result in an upper bound on natural mortality. If crabs mature at about age 7 to 9, an additional 7 or 8 years gives a maximum total age of about 14 to 17 years. However, due to exploitation occurring at the same time, the maximum age that would occur due to M alone would be greater than 14 to 17 years.

Tag recovery data for Bristol Bay red king crab males in the 1968 Japanese fishery contains shell condition and carapace length at time of tagging and time of recapture (INPFC 1969). Thirty two of 98 animals tagged in July to August, 1967 and recaptured May to October 1968 did not grow, however, were assigned shell condition 2 (new shell) at recapture. Those 32 animals were 12 to 18 months from molting, if they had molted in spring of 1967. This would indicate that about 33% of animals that are clean shell (SC2) are actually more than a year from molting. There were 47 crabs assigned new shell of 52 animals that were at large more than two years that did not grow (tagged in 1966 and recaptured in 1968). These animals would have been at least 2 years from molting. Tagging of Bristol Bay male red king crab was also conducted in 1990, 1991 and 1993. Recoveries occurred in the fishery that took place in October to November of each year. Recovery information was recorded primarily by ADF&G research staff, dockside samplers and observers on board vessels. Only the 1991 tagging data had sufficient recaptures in 1992 and 1993 for analysis. There were 56 animals that were recaptured in November, 1992 that were tagged in September to October, 1991 that had carapace length measured and were recorded as new shell at recapture. Of those 56 new shell animals, 21 did not grow in the 1 year between tagging and recapture. Those 21 animals (37.5 % of the new shell animals) were more than 1 ½ years from molting and were recorded as new shell. This is similar to the results from the 1968 tag recaptures, indicating that shell condition as prescribed is suspect as a rigorously quantified index of shell age. Based on these results, molting probabilities and natural mortality will be overestimated by using shell condition as an index of true shell age.

We examined the empirical evidence for reliable estimates of oldest observed age for snow crab. Radiometric aging of carapaces sampled in the Bering Sea stock in 1992 and 1993, as well as the ongoing tag recovery evidence from eastern Canada reveal observed maximum ages in exploited populations of 17-19 years. We reasoned that in a virgin population of snow crab, longevity would be at least 20 years. Hence, we used 20 years as a proxy for longevity and assumed that this age would represent the upper 99^{th} percentile of the distribution of ages in an unexploited population if observable. Under negative exponential depletion, the 99^{th} percentile corresponding to age 20 of an unexploited population corresponds to a natural mortality rate of 0.23. M=0.23 was used in all model runs presented here.

Molting probability

Female and male snow crab have a terminal molt to maturity. Many papers have dealt with the question of terminal molt for Atlantic Ocean mature male snow crab (e.g., Dawe, et al. 1991). A laboratory study of morphometrically mature male Tanner crab, which were also believed to have a terminal molt, found all crabs molted after two years (Paul and Paul 1995). Bering Sea male snow crab appear to have a terminal molt based on recent data on hormone levels (Sherry Tamone, per. comm.) and findings from molt stage analysis via setagenesis (Lou Rugolo, pers. comm.). The models presented here have a terminal molt for both males and females.

Male Tanner and snow crabs that do not molt (old shell) may be important in reproduction. Paul, et al (1995) found that old shell mature male Tanner crab out-competed new shell crab of the same size in breeding in a laboratory study. Recently molted males did not breed even with no competition and may not breed until after about 100 days from molting (Paul, et al. 1995). Sainte-Marie (2002) states that only old shell males take part in mating for North Atlantic snow crab. If molting precludes males from breeding for a three month period, then males that are new shell at the time of the survey (June to July), would have molted during the preceding spring (March to April), and would not have participated in mating. The fishery targets new shell males, resulting in those animals that molted to maturity and to a size acceptable to the fishery of being removed from the population before the chance to mate. Animals that molt to maturity at a size smaller than what is acceptable to the fishery may be subjected to fishery mortality from being caught and discarded before they have a chance to mate.

Crabs in their first few years of life may molt more than once per year, however, the smallest crabs included in the model are probably 3 or 4 years old and would be expected to molt annually.

The growth transition matrix was applied to animals that grow, resulting in new shell animals. Those animals that don't grow become old shell animals. Animals that are classified as new shell in the survey are assumed to have molted during the last year. The assumption is that shell condition (new and old) is an accurate measure of whether animals have molted during the previous year. The relationship between shell condition and time from last molt needs to be investigated further. Additional radiometric aging for male and female snow crab shells is being investigated to improve the estimate of radiometric ages from Orensanz (unpub. data).

Mating ratio and reproductive success

Full clutches of unfertilized eggs may be extruded and appear normal to visual examination, and may be retained for several weeks or months by snow crab (Rugolo, pers. comm., Alaska Fisheries Science Center, Seattle, Wa.). Resorbtion of eggs may occur if not all eggs are extruded resulting in less than a full clutch. Female snow crab at the time of the survey may have a full clutch of eggs that are unfertilized, resulting in overestimation of reproductive potential. Male snow crab are sperm conservers, using less than 4% of their sperm at each mating. Females also will mate with more than one male. The amount of stored sperm and clutch fullness varies with sex ratio (Sainte-Marie 2002). If mating with only one male is inadequate to fertilize a full clutch, then females will need to mate with more than one male, necessitating a sex ratio closer to 1:1 in the mature population, than if one male is assumed to be able to adequately fertilize multiple females.

The fraction barren females and clutch fullness observed in the survey increased in the early 1990's then decreased in the mid- 1990's then increased again in the late 1990's (Figures 25 and 26). The highest levels of barren females coincides with the peaks in catch and exploitation rates that occurred in 1992 and 1993 fishery seasons and the 1998 and 1999 fishery seasons. While the biomass of mature females was high in the early 1990's, the rate of production from the stock may have been reduced due to the spatial distribution of the catch relative and the resulting sex ratio in areas of highest reproductive potential.

The fraction of barren females in the 2003 and 2004 survey south of 58.5 deg N latitude was generally higher than north of 58.5 deg N latitude (Figures 27 and 28). In 2004 the fraction barren females south of 58.5 deg N latitude was greater for all shell conditions. In 2003, the fraction barren was greater for new shell and very very old shell south of 58.5 deg N latitude.

Female snow crab in waters less than 1.5 deg C and colder have been determined to be biennial spawners in the Bering Sea (Lou Rugolo, pers. comm.). Future recruitment may be affected by the fraction of biennial spawning females in the population as well as the estimated fecundity of females, which may depend on water temperature.

An index of reproductive potential for crab stocks needs to be defined that includes spawning biomass, fecundity, fertilization rates and frequency of spawning. In most animals, spawning biomass is a sufficient index of reproductive potential because it addresses size related impacts on fecundity, and because the fertilization rates and frequency of spawning are relatively constant over time. This is not the case for snow crab.

The centroids of the cold pool (<2.0 deg C) were estimated from the summer survey data for 1982 to 2003 (Figure 29). The centroid is the average latitude and average longitude. In the 1980's the cold pool was farther south(about 58 to 59 deg N latitude) except for 1987 when the centroid shifted to north of 60 deg N latitude. The cold pool moved north from about 58 deg N latitude in 1999 to about 60.5 deg N latitude in 2003. The cold pool was farthest south in 1989, 1999 and 1982 and farthest north in 1987, 1998, 2002 and 2003.

The clutch fullness and fraction of unmated females however, does not account for the fraction of females that may have unfertilized eggs. The fraction of barren females observed in the survey may not be an accurate measure of fertilization success because females may retain unfertilized eggs for months after extrusion. Rugolo (pers. comm.) sampled mature females from the Bering sea in winter and held them in tanks until their eggs hatched in March. All females then extruded a new clutch of eggs in the absence of males. All eggs were retained until the crabs were sacrificed near the end of August. Approximately 20% of the females had full clutches of unfertilized eggs. The unfertilized eggs could not be distinguished from fertilized eggs by visual inspection at the time they were sacrificed. Any index of fertilized females using the visual inspection method of assessing clutch fullness and percent unmated females may be an overestimate of fertilized females and not an accurate index of reproductive success.

McMullen and Yoshihara (1969) examined female red king crab around Kodiak Island in 1968 and found high percentages of females without eggs in areas of most intense fishing (up to 72%). Females that did not extrude eggs and mate were found to resorb their eggs in the ovaries over a period of several months. One trawl haul captured 651 post-molt females and nine male red king crab during the period April to May 1968. Seventy-six percent of the 651 females were not carrying eggs. Ten females were collected that were carrying eggs and had firm post-molt shells. The eggs were sampled 8 and 10 days after capture and were examined microscopically. All eggs examined were found to be infertile. This indicates that all ten females had extruded and held egg clutches without mating. Eggs of females sampled in October of 1968 appear to have been all fertile from a table of results in McMullen and Yoshihara(1969), however the results are not discussed in the text, so this is unclear. This may mean that extruded eggs that are unfertilized are lost between May and October.

Two model scenarios were run, one with discard mortality at 50% and one with discard mortality at 100%. The figures with fits to data are from the results for the model with discard mortality at 50%. The fishery for snow crabs occurs in winter when low temperatures and wind may result in freezing of crabs on deck before they are returned to the sea. Short term mortality may occur due to exposure, which has been demonstrated in laboratory experiments Zhou and Kruse (1998) and Shirley (1998), where 100% mortality occurred under temperature and wind conditions that may occur in the fishery. Even if damage did not result in short term mortality, immature crabs that are discarded may experience mortality during molting some time later in their life.

RESULTS

Model estimates in Tables 3 and 6 and in Figures 2 through 33 are from the 50% discard mortality model. Parameter estimates for the 50% discard mortality model are in Table 8. The total mature biomass increased from about 1,078 million lbs (328 mt) in 1978 to the peak biomass of 2,418 million lbs in 1990. Biomass declined sharply after 1996 to about 609 million lbs in 2004, then increased slightly to 678 million lbs in 2005 (Table 3 and Figure 2). The model is constrained by the population dynamics structure, including natural mortality, the growth and selectivity parameters and the fishery catches. The low observed survey abundance in the mid-1980’s were followed by an abrupt increase in the survey abundance of animals in 1987, which followed through the population and resulted in the highest catches recorded in the early 1990’s. Average discard catch mortality for 1978 to 2003 was estimated to be about 44% of the retained catch, a little higher than the observed discards from 1992 to 2003 (33%) (Table 1 and Figure 30). During the last four years (2000 to 2003 fishery seasons) model estimates of discard mortality averaged 34% of the retained catch. Estimates of discard mortality ranged from 14% of the retained catch to 69% of the retained catch.

Mature male and female biomass show similar trends (Table 3 and Figures 31 and 32). Mature male biomass increased from 2004 (330 million lbs) to 2005 (349 million lbs), while survey mature male biomass increased from 197 million lbs to 295 million lbs. Model estimates of mature female biomass increased from 279 million lbs in 2004 to 329 million lbs in 2005. Mature female biomass observed from the survey increased from 161 million lbs in 2004 to 211 million lbs in 2005.

Fishery selectivities and retention curves were estimated using ascending logistic curves (Figure 20, 21 and 33). Selectivities for trawl bycatch were estimated as ascending logistic curves (Figure 34). Plots of model fits to the survey size frequency data are presented in Figures 35 and 36 by sex for shell conditions combined. The model estimates higher numbers of mature old shell male and female crabs and lower numbers of new shell mature male and female crabs than observed from the survey. This could be due the size at maturity, which determines when males and females stop growing, or that shell condition is not an accurate estimator of shell age. Tagging results presented earlier indicate that animals that are more than one year from molting may be underestimated by using shell as a proxy for shell age. A method of verifying shell age is needed for all crab species.

Survey selectivities for the period 1978 to 1981 were estimated at less than 10% at about 27.5 mm and reached a maximum of 58% at about 55mm (Figure 22). Survey selectivities for the period 1982 to 1988 were estimated at 50% at about 88 mm and reached a maximum of 89% at 135 mm. Survey selectivities for the period 1989 to the present were estimated at 50% at about 70 mm and reached a maximum of 91% 135 mm. These selectivities were the best fit determined by the model, which are close to the values estimated by Somerton and Otto (1998). The survey selectivities are multiplied by the population numbers by length to estimate survey numbers for fitting to the survey data.

The estimated number of males > 101mm generally follows the observed survey numbers except for a few peak survey years where the model estimates are lower than the survey estimates (Figure 37). Current model estimates are close to the survey.

Two main periods of high recruitment were estimated by the model, in 1981-1984 (fertilization year) and in 1987-1989 (Figure 38). Recruits are 25mm to about 40 mm and may be about 4 years from hatching, 5 years from fertilization (Figure 39, although age is approximated). Low recruitments were estimated from 1990 to 1997 and in 2000. The 1999 year class appears to be a medium size recruitment that has resulted in an increase in biomass in 2005. The estimated recruitments lagged by 5 years (approximate fertilization year) from the model coincide with the higher survey estimates of abundance of females with eggs and abundance of females with eggs multiplied by the fraction full clutch from 1975 to 1987 (Figure 40). Recruitment was low from 1988 to 1998, showing no relationship to the reproductive index. Exploitation rates were generally higher in 1986 to 1994, and in 1998-99 than prior to 1986 (Figure 4).

The size at 50% selected for the pot fishery was close to 100 mm for all years, and was about 98 mm in 2005 for new shell males (Figure 21). Retention for old shell males was less than for new shell males (Figure 33). The fishery generally targets new shell animals with clean hard shells and all legs intact. The fits to the fishery size frequencies are in Figures 41 through 45. Fits to the trawl fishery bycatch size frequency data are in figures 46 and 47.

Fishing mortality rates ranged from about 0.2 to 2.2(Figure 48). Fishing mortality rates were 0.75 to 1.6, for the 1986 to 2003 fishery seasons (except F=2.2 in 1999). F was near 0.5 for the 2004 and 2005 fishery seasons.

Harvest Strategy and Projected Catch

Fmsy and Bmsy for Bering sea snow crab was estimated using the two model scenarios. Female effective spawning biomass was estimated the same as Siddeek (2003), assuming only old shell males take part in mating. The mating ratio of 1.7, was estimated from the ratio of mature females to old shell males fishing at F=0. Biomass and numbers were projected forward to the time of mating in the spring. If the numbers of old shell mature males (NMM_O) at the time mating occurs (accounting for natural mortality and removing the catch from the numbers at survey time) is less than the numbers of mature females (NMF) at the time mating occurs, divided by the mating ratio (η = 1.7), then the female mature biomass (fspbio) is reduced to estimate effective female spawning biomass (efspbio),

$$efspbio = fspbio * \frac{NMM_O * \eta}{NMF}$$

If the number of old shell mature males at mating time is more than the numbers of mature females at the time mating occurs, divided by the mating ratio (η = 1.7), then effective female spawning biomass is estimated to be equal to female spawning biomass. effective male spawning biomass is set equal to old shell male mature biomass. The effective female spawning biomass is added to the effective male spawning biomass to obtain total effective spawning biomass.

The parameters of the Beverton and Holt spawner recruit curve (steepness and R0) were estimated in a model separate from the population dynamics model using total effective spawning biomass at the time of mating and recruits estimated from the population dynamics model for 1978 to 2005 (Figure 49),

$$\mathrm{Re}\,cruits = \frac{(0.8 * R0 * h * \gamma_0)}{0.2 * \gamma_0 * R0 * (1-h) + (h-.2) * \gamma_c}$$

γ_c is total effective total spawning biomass at the time of mating, γ_0 is effective total spawning biomass per recruit at F=0, R0 is the recruitment that would occur when the stock is at the total effective spawning biomass for F=0, and h is the steepness parameter (Gabriel et al. 1989, Dorn 2002). Steepness is the proportion of R0 that recruits when the stock is reduced to 20% of the unfished effective total spawning biomass. When steepness is 1.0, recruits are independent of stock biomass, when steepness is at the lower limit (0.2) recruits linearly increase with stock biomass.

A normal prior distribution was used for the steepness parameter with a mean of 0.52 (the steepness estimated for Bristol Bay red king crab, Siddeek, pers. comm.) and a standard deviation of 0.6. A normal prior distribution was also used for the R0 parameter (the recruitment at B0) with a mean equal to the average model recruitment when effective spawning biomass was above the median (prior for R0 = 2.0), and a cv of 0.6.

Current Harvest Strategy

Harvest strategy simulations are reported by Zheng et al. (2002) based on a model with structure and parameter values different than the model presented here. The harvest strategy by Zheng et al. (2002) was developed for use with survey biomass estimates and was applied to survey biomass estimates to calculate the 2006 fishery catch. Bmsy is defined in the current crab FMP as the average total mature survey biomass for 1983 to 1997. MSST is defined as ½ Bmsy. The harvest strategy consists of a threshold for opening the fishery (230.4 million lbs of total mature biomass(TMB), 0.25*Bmsy), a minimum GHL of 15 million lbs for opening the fishery, and rules for computing the GHL.

Under current FMP (Fishery Management Plan) definitions for MSY biomass (B_{MSY} = 921.6 million pounds TMB) and overfishing rate (F_{MSY} =M=0.3), the exploitation rate to apply to current mature male biomass (MMB), is determined as a function of TMB as,

$$E = \frac{0.75 * Fmsy * \left[\frac{TMB}{Bmsy} - \alpha \right]}{(1-\alpha)}$$

for TMB ≥ 0.25*Bmsy and TMB<Bmsy, where α = -0.35, and,

- E = (Fmsy * 0.75) = 0.225, for TMB ≥ Bmsy, and E = 0 for TMB < 0.25*Bmsy.

The maximum for a GHL_{max} is determined by using the E determined from the control rule as an exploitation rate on mature male biomass at the time of the survey,

- GHL_{max} = E•MMB.

There is a 58% maximum harvest rate on exploited legal male abundance. Exploited legal male abundance is defined as the estimated abundance of all new shell legal males >=4.0-in (102 mm) CW plus a percentage of the estimated abundance of old shell legal males >=4.0-in CW. The percentage to be used is determined using fishery selectivities for old shell males.

Alternative Harvest Strategies

An alternative harvest strategy based on reference points estimated here is the Fmax=0.75 Fmsy harvest strategy which follows those developed for North Pacific groundfish stocks (SAFE 2004) (Figure 50).

$$F = \frac{0.75 * Fmsy * \left[\frac{TESB}{Bmsy} - \alpha \right]}{(1-\alpha)}$$

TESB is total effective spawning biomass at the time of mating. Fmsy was estimated at 0.848 by simulation using the spawner recruit curve estimated here. Bmsy was estimated at 856 million lbs of total effective spawning biomass at mating time using simulation with the estimated spawner recruit curve. α = 0.05, and the F is set to zero when total effective spawning biomass is below 25% of Bmsy (Figure 50).

Estimated fishing mortality from 1980 fishing season to 2005 have been above the Fmsy control rule except for two years (1983 and 1984) (Figure 50). The target F historically (pre-2000 fishery season) was about 1.1 which was exceeded in many years. The last two fishery seasons F was estimated at 0.48 and 0.55, also above the Fmsy control rule.

The catch using the Fmax=0.75 Fmsy harvest strategy is estimated by the following equation,

$$catch = \sum_{s}\sum_{l} \; (1 - e^{-(F*Sel_{S,i})}) w_l N_{S,l} \; e^{-M*.62}$$

Where $N_{S,l}$ is the 2005 numbers at length(l) for mature males by shell condition(s) at the time of the survey estimated from the population dynamics model, M is natural mortality, 0.62 is the time elapsed (in years) from when the survey occurs to the fishery, F is the value estimated from the harvest control rule using the projected 2006 effective total spawning biomass at mating time, and w_l is weight at length. $Sel_{S,l}$ are the fishery selectivities by length and shell condition for the total catch (retained plus discard) or for the retained catch estimated from the population dynamics model averaged over the last three years (2003 to 2005 fishery seasons) (Figure 24).

Fmsy and 2006 catches as well as other reference points were estimated for each of the scenarios (Table 6). The 2006 TESB is estimated to be at 38% of Bmsy for the 50% discard scenario. The Fmsy (full selection F) was 0.848 and the maximum target F = 0.75*Fmsy = 0.636. The 2006 target retained catch was estimated at 9.9 million lbs. The target total catch for 2006 was estimated at 13.6 million lbs. The 2006 retained catch for the 100% discard mortality scenario is 6.7 million lbs, with 2006 TESB estimated at 32% of Bmsy.

There is uncertainty in the estimation of the spawner recruit curve which is important in the determination of the reference points. Analysis of the influence of the shape of the spawner recruit curve and proxy values for reference points should improve the estimation of harvest strategies and overfishing definitions (work currently in progress by the crab overfishing definitions working group). The Bmsy estimate for TESB is above all historical estimates of TESB, which would be expected given that historical fishing mortality rates have been high relative to Fmsy. While Bmsy for TESB was 856 million lbs and the average was 541 million lbs. The Bmsy for average total mature biomass (TMB) was 1,600 million lbs and the average TMB from the model was 1,274 million lbs. Model estimates of TMB exceeded Bmsy in 5 years and were close to Bmsy in several other years. The TESB is effected by fishing through the mating ratio and is reduced more than TMB by fishing. The average recruitment in the model was 1.9 billion crab and R0 was estimated at 3.0 billion crab. Given that fishing has been well above Fmsy, the recruitment at Bmsy would be expected to be above the average model recruitment, and R0 (the recruitment at F=0) would be expected to be above the recruitment at Bmsy.

An alternative estimate of Bmsy that does not rely on R0 uses spawning biomass per recruit(sbpr) analysis and average model recruitment. Given the steepness of the spawner recruit curve (0.54) the sbpr (using TESB) was estimated at the maximum catch and multiplied by average recruitment from the model (1.9 billion crab). The proxy for Bmsy was estimated at 828 million lbs, slightly less than the Bmsy using the spawner recruit curve (856 million lbs).

The 2006 catch using the current harvest strategy with estimates of Fmsy = M = 0.3 and Bmsy = 921.6 million lbs was calculated using 2005 survey mature biomass estimates. The survey biomass estimate for total mature biomass in 2005 was 505 million lbs (55% of Bmsy =921.6 million lbs) and mature male biomass was 295 million lbs. The exploitation rate on survey mature male biomass for 2006 estimated from the harvest control rule with Fmsy = 0.3, Bmsy = 921.6 million lbs and α = -0.35, was 0.15, resulting in an estimated 2006 catch of 44 million lbs. However, the exploitation cap of 58% on 100% new shell and 25% old shell males >101 mm, caps the 2006 catch of 31 million lbs. A 2006 catch of 31 million lbs would result in a full selection fishing mortality in 2006 of 0.77.

Computing the catch based on the complete survey biomass may result in exploitation rates higher than the target rate on crabs in the southern area of the distribution. One solution would be to split the catch into two regions, north and south, according to the percent distribution of the survey estimate of large males or mature males from those regions. This would require knowing the location of catch inseason. Two other approaches would not require knowledge on inseason catch location. One approach would be to compute the catch from that portion of the stock where most of the catch is extracted. Another approach would be to compute a catch that would result in the target harvest rate for the southern portion of the stock and increase that catch according to the percent catch in the north.

Projections and Rebuilding Scenarios

Projections and rebuilding trajectories were estimated using simulation with several harvest control rules and lognormally distributed, autocorrelated recruitment (cv recruitment =0.86, autocorrelation = 0.6). Rebuilding under the Fmax = 0.75 Fmsy control rule would occur after 30 years (50% probability of being above Bmsy) using recruitments for all years estimated in the model (Figure 51). If recruitment in the future is near the average low levels of the last 10 years, then the stock would not rebuild to Bmsy estimated using the spawner recruit curve with all recruitments (Figure 52). Rebuilding to the reference points estimated here would not occur under the current harvest strategy (Figure 53). Long term catches are similar for the Fmax = 0.75 Fmsy and the current harvest strategy, although the catches for the current harvest strategy are more variable (Figures 54 and 55). The current harvest strategy results in the biomass falling below ½ Bmsy 12% of the time (63% below Bmsy), while for the Fmax=0.75

Fmsy harvest strategy biomass would fall below ½ Bmsy 2.2% of the time (42% below Bmsy).

Rebuilding under F=0 would occur in 5 years (Figure 56). The maximum time to rebuild (Tmax) would be one mean generation time (estimated at 9.7 years) plus the time to rebuild under F=0 (5 years), which results in a Tmax of 15 years. A control rule with the maximum F = 0.4 Fmsy and the alpha = 0.05, would result in rebuilding in 15 years (Figure 57). Expected catches would be lower than the Fmax = 0.75 Fmsy control rule during the rebuilding period (Figure 58).

5 Year Projections

Projections of TESB and retained catch for various control rules indicate that biomass and catch are expected to increase over the next five years due to a moderate size recruitment to the model in 2004 (Table 7). Future survey data will reduce uncertainty in the estimate of the strength of this recruitment. Using the Fmax= 0.75 Fmsy control rule TESB increases from 330 million lbs in 2006 to 609 million lbs in 2010 (Table 7). Mean retained catch in 2006 is projected to be 10 million lbs, increasing to 81 million lbs in 2009, then decreasing to 58 million lbs in 2010. The control rule that would allow rebuilding in 15 years (Fmax = 0.4 Fmsy) has retained catch increasing from 6.4 million lbs in 2006 to 53 million lbs in 2009 then decreasing to 42 million lbs in 2010.

Conservation concerns

- The Bering Sea snow crab model estimates of total effective spawning biomass are currently at the lowest level in the 25 year time period from 1978 to 2005.

- Survey total mature biomass increased in 2005, however, estimates declined from a peak in 1991 to below 50% Bmsy in 1999 and in 2002 through 2004.

- A moderate recruitment is estimated in 2004, however, in general recruitment has been at low levels in the last 10 years (since 1994). Biomass is expected to increase in the next few years, however, this relies on the 2004 recruitment remaining a moderately strong recruitment.

- There is uncertainty in discard mortality due to low coverage of total pot lifts and only 10% coverage of catcher vessels which only started in 2001. Higher discard mortality would necessitate lower retained catches.

- Exploitation rates in the southern portion of the range of snow crab may have been higher than target rates, possibly contributing to the shift in distribution to less productive waters in the north.

Research Needs

Research is needed to improve our knowledge of snow crab life history and population dynamics to reduce uncertainty in the estimation of current stock size, stock status and optimum harvest rates.

Tagging programs need to be initiated to estimate longevity and migrations. Studies and analyses are needed to estimate natural mortality. Additional sampling of crabs that are close to molting is needed to estimate growth for immature males and females.

The lower number of mature old shell male crabs in the observed survey compared to what are expected in the model needs to be reconciled. Harvest rates and status of the stock are highly dependent on what the discrepancy is due to. The differences could be due to higher fishery discard mortality, higher natural mortality of mature animals, differential catchability of new and old shell animals in the survey, or the estimation of when maturity occurs, which determines when animals stop growing and subsequently move from new shell to old shell animals. In addition, the assignment of crabs to new and old shell condition used in the survey data may not be an accurate measure of time from the last molt.

Increased observer coverage is needed on catcher vessels in the directed snow crab fishery to improve estimates of discards. Field studies are needed to estimate mortality of discards in the winter snow crab pot fisheries where freezing temperatures and wind chill are important factors.

Some method of aging crab needs to be developed. Current research is being conducted using lipofuscin to age crabs and continued radiometric aging of shells of mature crabs is also being conducted (results may be available the end of 2004). However, at this time it is not known if the lipofuscin method will be successful, and radiometric aging is time consuming, so only small numbers of animals can be aged at present. Aging methods will provide information to assess the accuracy of assumed ages from assigned shell conditions (i.e. new, old, very old, etc), which have not been verified, except with the 21 radiometric ages reported here from Orensanz (unpub data).

Techniques for determining which males are effective at mating and how many females they can successfully mate with in a mating season are needed to estimate population dynamics and optimum harvest rates. At the present time it is assumed that when males reach morphometric maturity they stop growing and they are effective at mating. Field studies are needed to determine how morphometric maturity corresponds to male effectiveness in mating. In addition the uncertainty associated with the determination of morphometric maturity (the measurement of chelae height and the discriminate analysis to separate crabs into mature and immature) needs to be analyzed and incorporated into the determination of the maturity by length for male snow crab.

The experiment to estimate catchability of the survey trawl net needs to be repeated with larger sample sizes to allow the estimation of catchability by length, sex and shell condition for snow crab (and Tanner crab). This is needed to determine if the number of mature old shell crabs in the observed survey (which are lower than expected in the model) are due to mortality (fishery discard or natural mortality) or due to lower catchability in the trawl survey.

Female opilio in waters less than 1.5 deg C and colder have been determined to be biennial spawners in the Bering Sea (Lou Rugolo, pers. comm.). Future recruitment may be affected by the fraction of biennial spawning females in the population as well as the estimated fecundity of females, which may depend on water temperature.

Analysis needs to be conducted to determine a method of accounting for the spatial distribution of the catch and abundance in computing quotas.

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Table 1. Catch (1,000s of lbs) for the snow crab pot fishery and groundfish trawl bycatch. Retained catch for 1973 to 1981 contain Japanese directed fishing. Discarded catch is the total estimate of discards before applying mortality. Discards from 1992 to 2004 were estimated from observer data.

Year fishery occurred	retained catch(1,000s of lbs)	Observed Discard male catch	Retained + discard male catch	Model estimate of male discard	Discard female catch	Year of trawl bycatch	trawl bycatch
1973	6,711					1973	30,046
1974	5,033					1974	41,582
1975	8,250					1975	16,096
1976	10,050					1976	6,975
1977	16,284					1977	4,722
1978-79	52,272			2,437	73	1978	5,422
1979-80	75,025			2,780	91	1979	4,331
1980-81	66,933			3,553	81	1980	3,150
1982	29,355			3,639	46	1981	1,314
1983	26,128			2,817	62	1982	535
1984	26,813			2,335	44	1983	689
1985	65,999			6,420	43	1984	732
1986	97,984			17,531	44	1985	628
1987	101,903			31,583	96	1986	2,699
1988	135,355			36,474	139	1987	8
1989	149,456			48,143	148	1988	968
1990	161,821			62,541	192	1989	1,124
1991	328,647			65,517	204	1990	860
1992	315,302	96,214	402,897	79,463	234	1991	9,401
1993	230,787	124,865	355,652	59,118	481	1992	4,552
1994	149,776	38,922	188,698	27,145	321	1993	2,892
1995	75,253	29,436	104,689	15,907	232	1994	3,219
1996	65,713	42,104	107,817	20,213	63	1995	1,794
1997	119,543	54,391	173,934	26,012	277	1996	2,063
1998	243,342	41,982	294,171	28,770	22	1997	2,884
1999	194,000	34,158	228,358	20,755	26	1998	2,146
2000	33,500	3,790	37,081	3,044	2	1999	788
2001	25,256	4,537	29,794	2,364	2	2000	611
2002	32,722	13,824	46,546	5,588	17	2001	
2003	28,307	9,938	38,245	4,691	3	2002	
2004	23,663	4,196	27,859	1,998	6	2003	
2005	24,560	-	-	1,692	-	2004	

Table 2. Observed survey female, male and total spawning biomass(millions of lbs) and numbers of males > 101mm (millions of crab).

Year	Observed survey female mature biomass	Observed survey male mature biomass	Observed survey total mature biomass	Observed number of males > 101mm (millions)
1978	273.0	424.9	697.9	163.4
1979	584.9	528.7	1,113.7	169.1
1980	733.8	385.1	1,118.9	109.0
1981	391.8	262.1	653.9	45.4
1982	411.2	403.0	814.3	65.0
1983	260.2	355.3	615.5	71.5
1984	118.5	387.5	506.0	154.2
1985	17.4	167.2	184.6	78.2
1986	45.8	200.9	246.7	80.0
1987	365.7	462.2	827.9	141.9
1988	451.9	538.8	990.6	167.3
1989	825.6	712.3	1,537.9	175.4
1990	529.6	905.4	1,435.0	407.2
1991	650.3	981.8	1,632.2	466.6
1992	376.1	574.8	950.9	251.4
1993	416.3	545.3	961.6	140.8
1994	387.9	379.4	767.4	80.3
1995	514.1	507.8	1,021.9	69.0
1996	362.6	744.9	1,107.5	170.1
1997	322.7	663.5	986.2	308.5
1998	237.6	529.3	766.9	244.0
1999	93.4	216.6	310.0	92.2
2000	307.2	227.1	534.3	75.6
2001	258.9	339.2	598.1	79.4
2002	98.3	232.8	331.1	73.5
2003	106.7	197.8	304.4	64.6
2004	161.0	196.6	357.7	65.8
2005	210.6	294.8	505.4	68.9

Table 3. Model estimates of population biomass, population numbers, male, female and total mature biomass(million lbs) and number of males greater than 101 mm in millions. Recruits enter the population in the spring of the survey year.

Year	Biomass (million lbs 25mm+)	numbers (million crabs 25mm+)	female mature biomass	Male mature biomass	total mature biomass	Number of males >101mm (millions)	Recruitment (millions, 25 mm to 50 mm)	Effective spawning biomass at mating time	Ratio mature females to old shell mature males
1978	1,512	12,267	394	684	1,078	212			
1979	1,649	10,673	594	651	1,246	205	976	711	1.4
1980	1,638	9,227	849	536	1,386	155	807	733	2.4
1981	1,490	7,715	848	456	1,304	107	439	673	3.6
1982	1,368	6,789	724	471	1,196	120	689	592	4.0
1983	1,306	7,254	610	497	1,107	143	1,885	546	3.8
1984	1,291	7,313	542	497	1,038	150	1,573	535	3.4
1985	1,288	7,051	517	455	973	114	1,299	484	3.5
1986	1,778	18,722	498	459	957	90	13,218	400	3.9
1987	2,333	16,855	823	533	1,356	131	2,118	348	4.0
1988	2,790	16,085	1,307	620	1,927	130	2,857	334	7.7
1989	3,002	14,745	1,330	872	2,203	147	2,166	374	9.4
1990	2,998	12,326	1,223	1,196	2,418	401	852	510	7.2
1991	2,555	10,100	1,086	1,067	2,153	295	670	700	5.3
1992	2,089	9,772	922	833	1,755	207	2,124	697	4.8
1993	1,851	11,532	806	650	1,455	152	4,044	658	4.4
1994	1,818	11,123	802	532	1,335	93	2,117	612	4.3
1995	1,910	9,321	837	576	1,412	82	571	546	4.8
1996	1,964	7,684	782	767	1,550	155	363	539	5.0
1997	1,821	6,221	667	903	1,570	259	253	618	4.0
1998	1,399	5,177	552	718	1,270	185	463	722	3.1
1999	1,038	4,647	459	479	938	77	703	689	2.8
2000	915	4,170	396	411	807	67	506	594	2.7
2001	830	3,606	351	365	716	57	316	491	2.8
2002	774	3,713	307	339	646	56	881	431	2.9
2003	770	4,291	277	333	610	68	1,370	381	2.8
2004	868	6,129	279	330	609	73	2,739	356	2.8
2005	990	5,382	329	349	678	70	532	341	3.1

Table 4. Radiometric ages for male crabs for shell conditions 1 through 5. Data from Orensanz (unpub).

				Radiometric age	
Shell Condition	description	sample size	Mean	minimum	maximum
1	soft	6	0.15	0.05	0.25
2	new	6	0.69	0.33	1.07
3	old	3	1.02	0.92	1.1
4	very old	3	5.31	4.43	6.6
5	very very old	3	4.59	2.7	6.85

Table 5. Natural mortality estimates for Hoenig (1983) and the 5% rule given the oldest observed age.

	Natural Mortality	
oldest observed age	Hoenig (1983) empirical	5% rule
10	0.42	0.3
15	0.28	0.2
17	0.25	0.18
20	0.21	0.15

Table 6. Estimated reference points, fishing mortality and catch for 2006 Bering Sea snow crab fishery. Biomass is in millions of lbs. Scenario 1 has mortality on discarded crab at 50%. Scenario 2 has mortality on discarded crab at 100%.

Scenario	50% mort	100% mort
Fmsy (full selection F)	0.848	0.623
F maximum (0.75*Fmsy)	0.636	0.467
Exploitation rate for total catch at Fmsy on MMB at time of the fishery	0.178	0.169
Exploitation rate for retained catch at Fmsy on MMB at time of the fishery	0.139	0.123
Bmsy total mature biomass	1600	
Bmsy effective total mature biomass at mating time	856	1016
1/2 Bmsy for effective total mature biomass at mating time	428	508
2005 model estimate of effective total mature biomass at mating time	330	326
Percent of Bmsy for 2005 model estimate of effective total mature biomass at mating time	39%	32%
R0 (billion crabs)	3.0	3.4
Steepness	0.54	0.56
F 2006 fishery	0.225	0.133
2006 Male mature biomass at time of fishery	303	300
2006 Fmsy total catch(discard+retained)	17.6	12.7
2006 Fmsy retained catch	12.7	8.7
2006 target total catch(discard + retained)	13.6	9.7
2006 target retained catch	9.9	6.7

Table 7. Projections of total effective spawning biomass at mating time (TESB in millions of lbs) and retained catch (RC in millions of lbs) for various harvest control rules. F target has maximum F = 0.75 Fmsy, Fmsy control rule the maximum is Fmsy. The F rebuild control rule has a maximum F = 0.4 Fmsy. Current HS is the current harvest strategy. All runs use parameters from the 50% discard mortality scenario. Expl Males>101 is the biomass of males greater than 101 mm at the beginning of the fishery multiplied by the fishery selectivities.

		Year of the Fishery				
	Biomass or					
Control Rule	Catch (million lbs)	2006	2007	2008	2009	2010
F target	Expl Males>101	49.2	86.1	142.2	219.6	146.9
	TESB	330	378.4	466.4	572	609.4
	RC	10	22.7	46.6	81	58
F msy	Expl Males>101	49.2	84.4	138.2	211.7	135.2
	TESB	327.8	371.8	453.2	547.8	574.2
	RC	12.7	28.3	56.7	95.5	64.2
F = 0	Expl Males>101	49.2	92.0	157.5	253.7	206.3
	TESB	338.8	400.4	521.4	686.4	809.6
	RC	0	0	0	0	0
Current HS	Expl Males>101	49.2	75.1	123.4	194.2	126.7
	TESB	314.6	343.2	413.6	508.2	530.2
	RC	31	45.3	70	87.7	75.6
F rebuild	Expl Males>101	49.2	88.7	148.6	233.2	168.5
	TESB	334.4	387.2	488.4	613.8	679.8
	RC	6.4	13.4	28.7	53	42.1

Table 8. Parameters values for model, excluding recruitments, changing fishery selectivity and fishing mortality parameters.

Natural Mortality	0.23
Female intercept (a) growth	12.29
Male intercept(a) growth	8.47
Female slope(b) growth	1.05
Male slope (b) growth	1.19
Beta for gamma distribution of recruits	1.5
Beta for gamma distribution female growth	0.75
Beta for gamma distribution male growth	0.75
Fishery selectivity total new slope	0.26
Fishery selectivity total new length at 50%(mean last 3 years)	99.07
Fishery selectivity total old slope	0.11
Fishery selectivity total old length at 50%(mean last 3 years)	125.20
Fishery selectivity retention curve new shell slope	0.34
Fishery selectivity retention curve new shell length at 50%	93.55
Fishery selectivity retention curve old shell slope	0.36
Fishery selectivity retention curve old shell length at 50%	95.73
Pot Fishery discard selectivity female slope	0.25
Pot Fishery discard selectivity female length at 50%	61.26
Trawl Fishery selectivity female slope	0.06
Trawl Fishery selectivity female length at 50%	99.27
Trawl Fishery selectivity male slope	0.16
Trawl Fishery selectivity male length at 50%	75.00
Survey Q 1978-1981	0.58
Survey 1978-1981 length at 95% selected	45.00
Survey 1978-1981 length at 50% selected	34.89
Survey Q 1982-1988	1.000
Survey 1982-1988 length at 95% selected	150.000
Survey 1982-1988 length at 50% selected	88.36
Survey Q 1989-present	1.000
Survey 1989-present, length at 95% selected	150.000
Survey 1989-present length at 50% selected	70.3
Fishery cpue q	0.000987

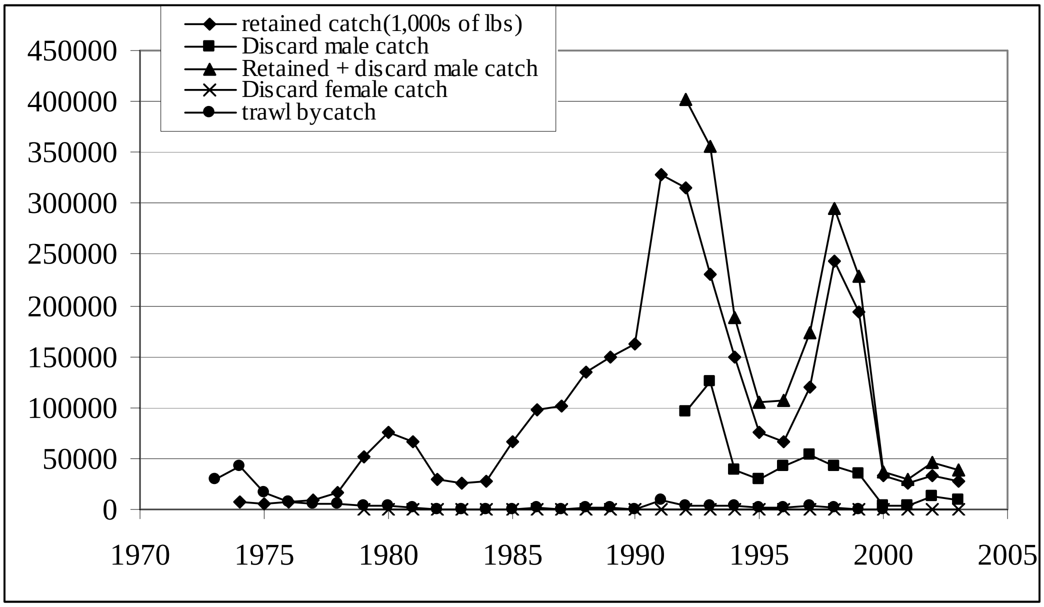

Figure 1. Catch (1,000s lbs) from the directed snow crab pot fishery and groundfish trawl bycatch. Retained and total catch are males only, female catch is the discard mortality from the directed pot fishery and trawl is male and female bycatch from groundfish trawl fisheries.

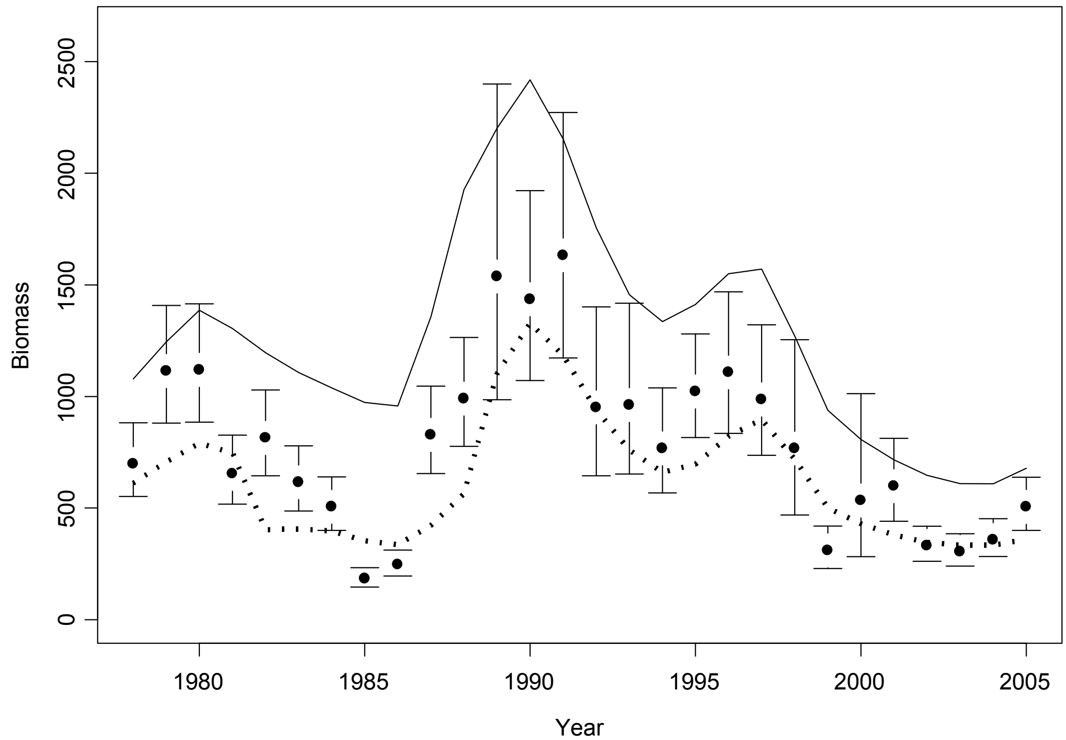

Figure 2. Population total mature biomass (millions of pounds, solid line), model estimate of survey mature biomass (dotted line) and observed survey mature biomass with approximate lognormal 95% confidence intervals.

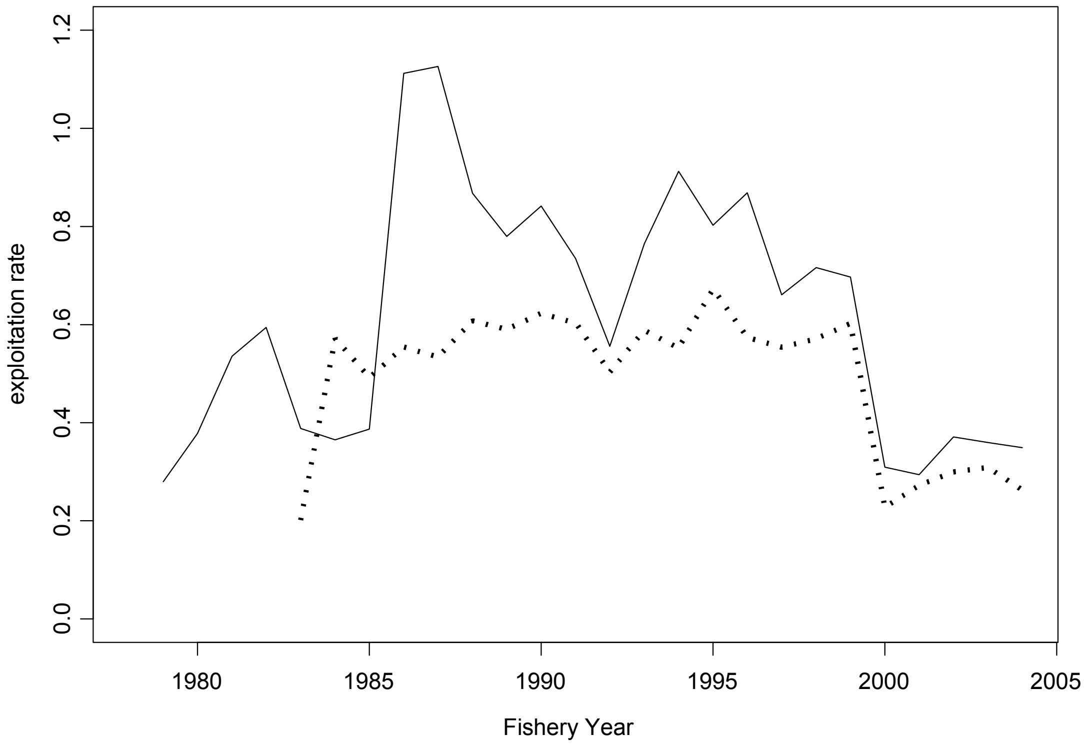

Figure 3. Exploitation rate estimated as the preseason GHL divided by the survey estimate of large male biomass (>101 mm) at the time the survey occurs (dotted line). The solid line is the retained catch divided by the survey estimate of large male biomass at the time the fishery occurs. Year is the year the fishery occurred.

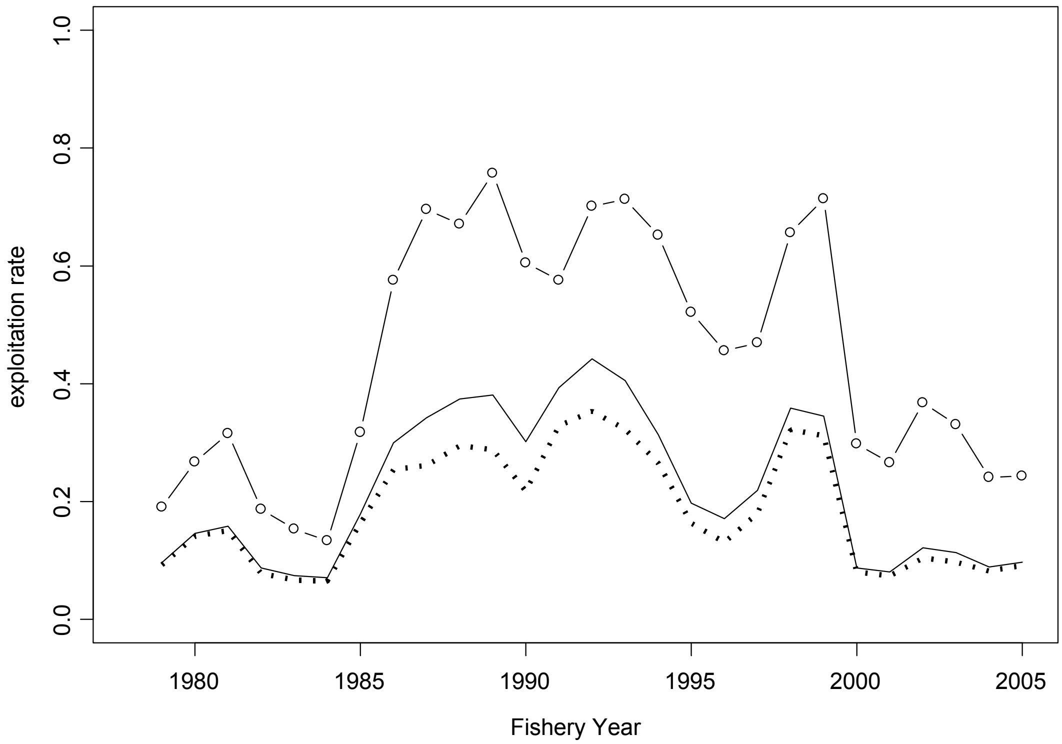

Figure 4. Exploitation fraction estimated as the catch biomass (total or retained) divided by the mature male biomass from the model at the time of the fishery (solid line and dotted line). The exploitation rate for total catch divided by the male biomass greater than 101 mm is the solid line with dots. Year is the year of the fishery.

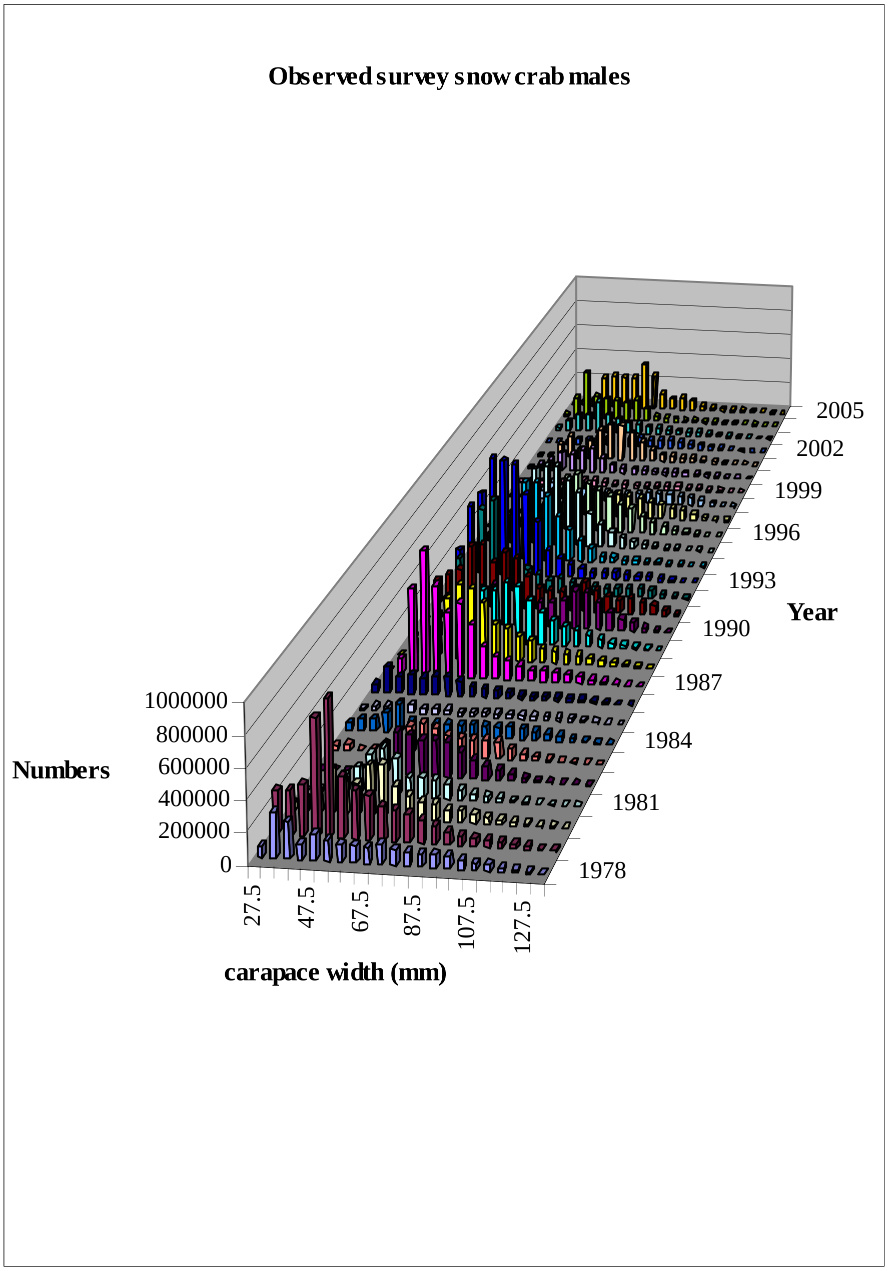

Figure 5. Observed survey numbers (1000's of crab) by carapace width and year for male snow crab.

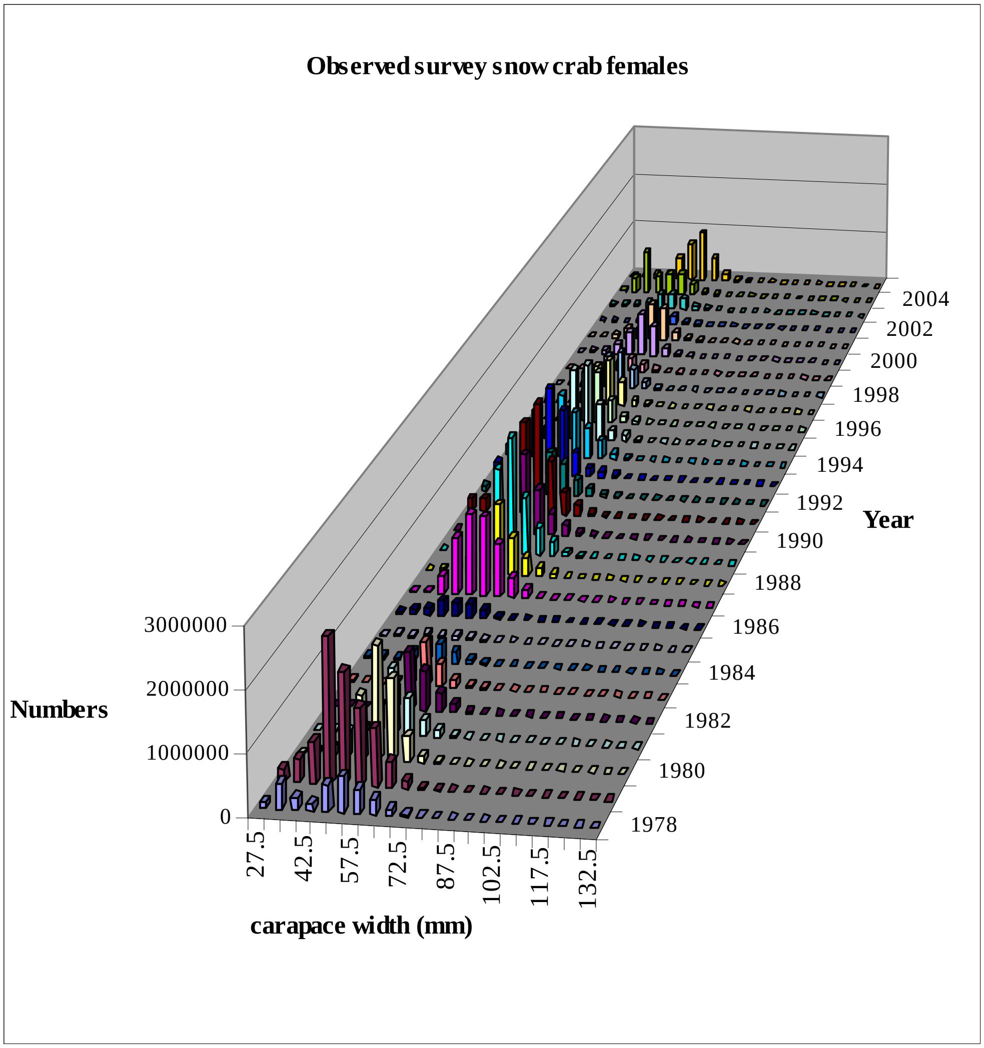

Figure 6. Observed survey numbers (1000's of crab) by carapace width and year for female snow crab.

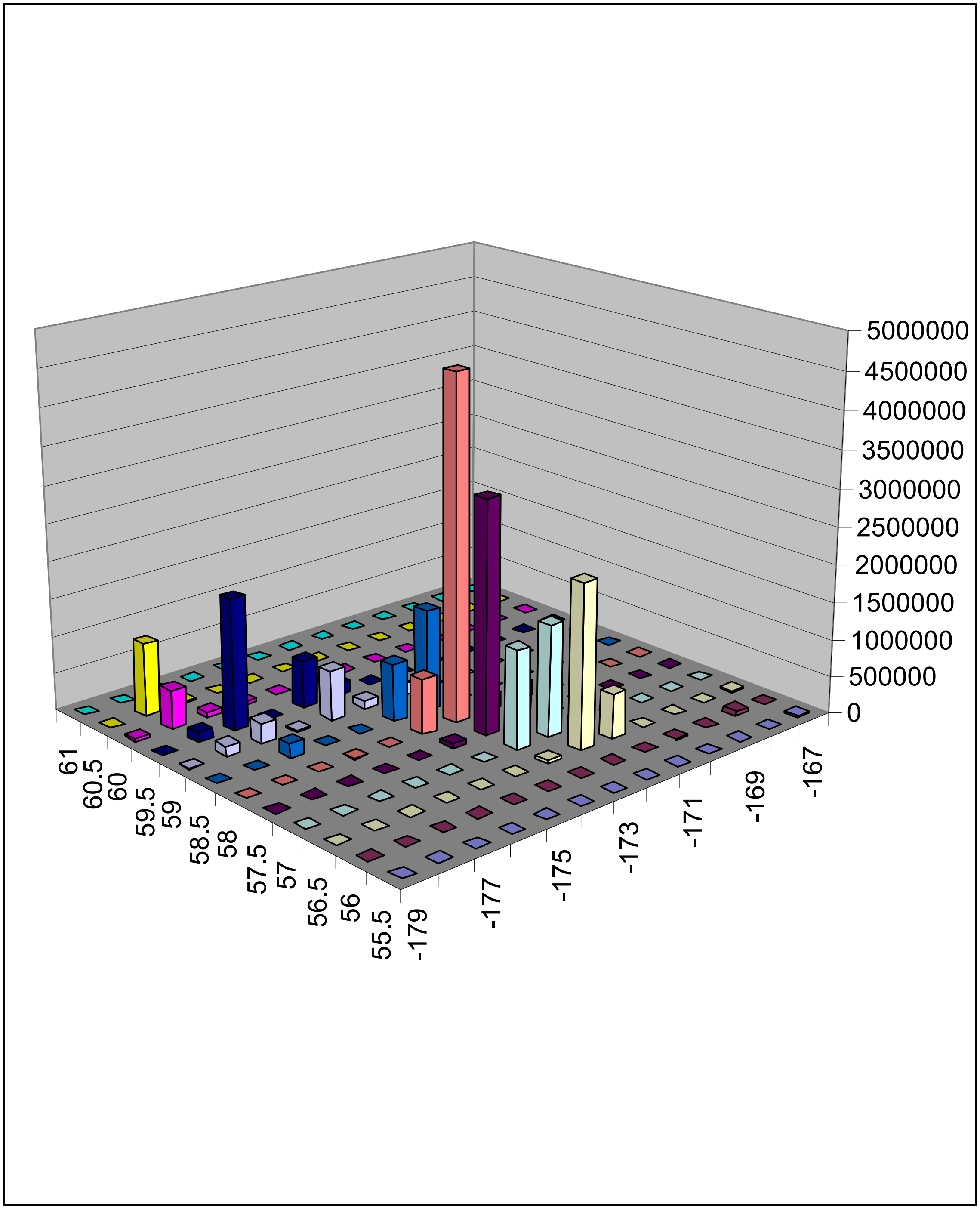

Figure 7. 2003 pot fishery retained catch in numbers by statistical area. Longitude in negative degrees. Areas are 1 degree longitude by 0.5 degree latitude.

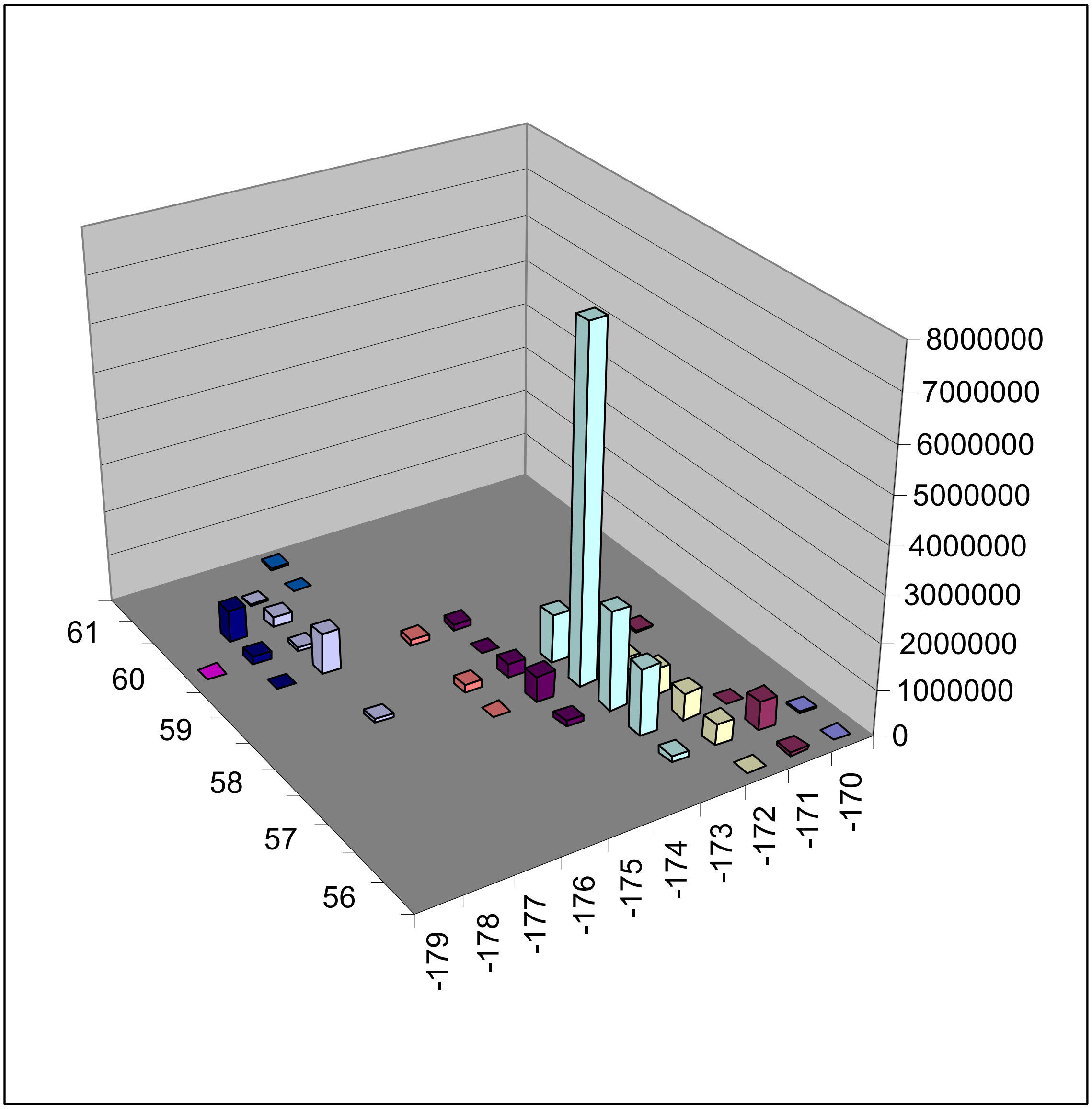

Figure 8. 2004 pot fishery retained catch in numbers by statistical area. Longitude in negative degrees. Areas are 1 degree longitude by 0.5 degree latitude.

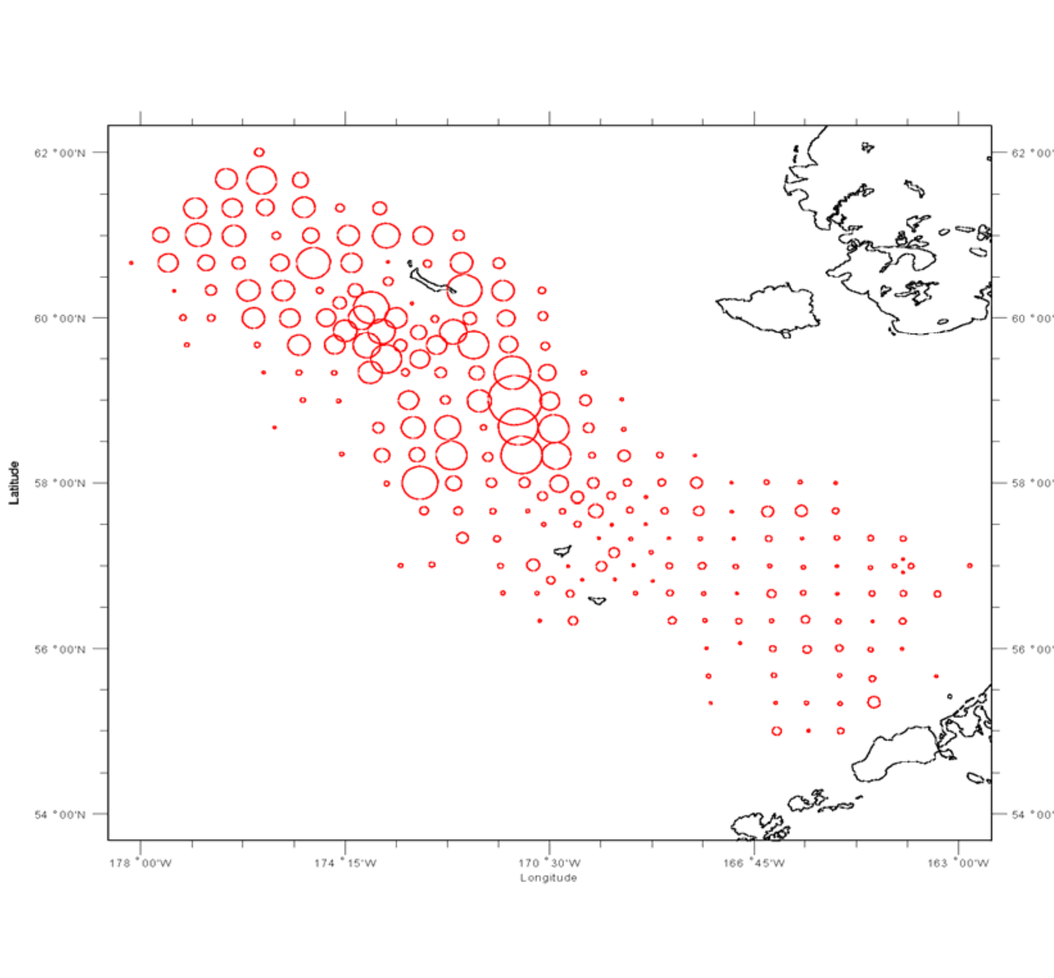

Figure 9. 2004 Survey abundance of males > 79 mm (approximately mature abundance) by tow. Abundance is proportional to the area of the circle (not on same scale as female abundance in Figure 51).

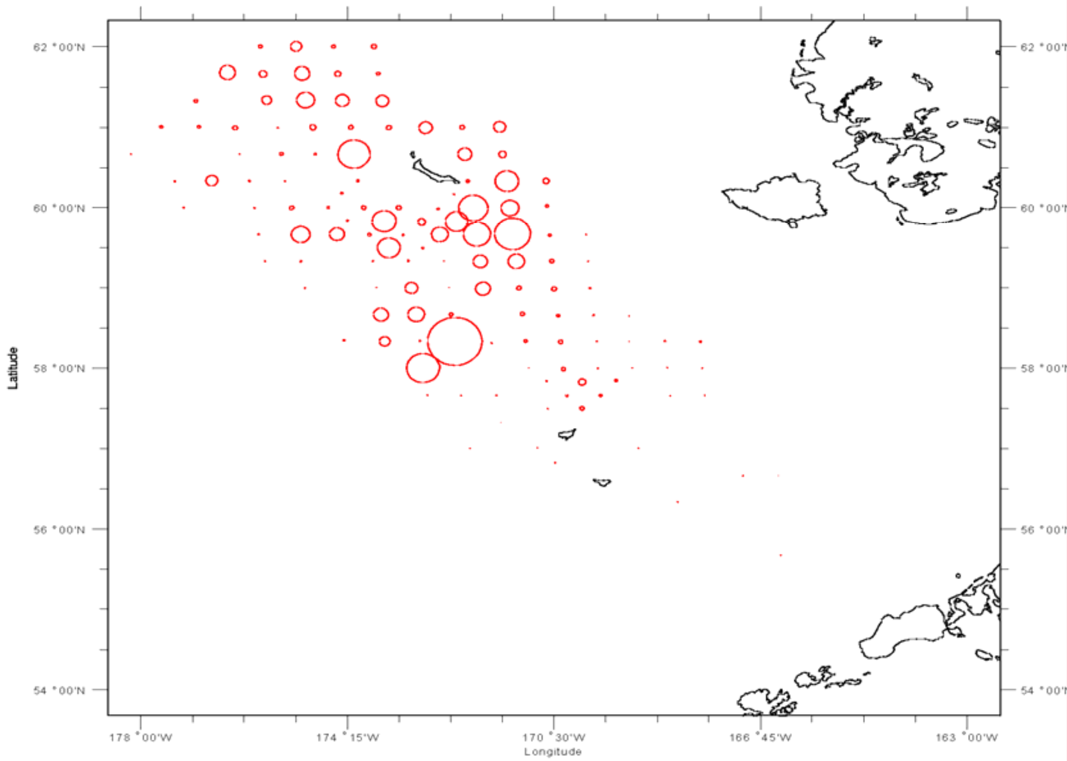

Figure 10. 2004 Survey abundance of females > 49 mm (approximately mature abundance) by tow. Abundance is proportional to the area of the circle (not on the same scale as male abundance in Figure 9).

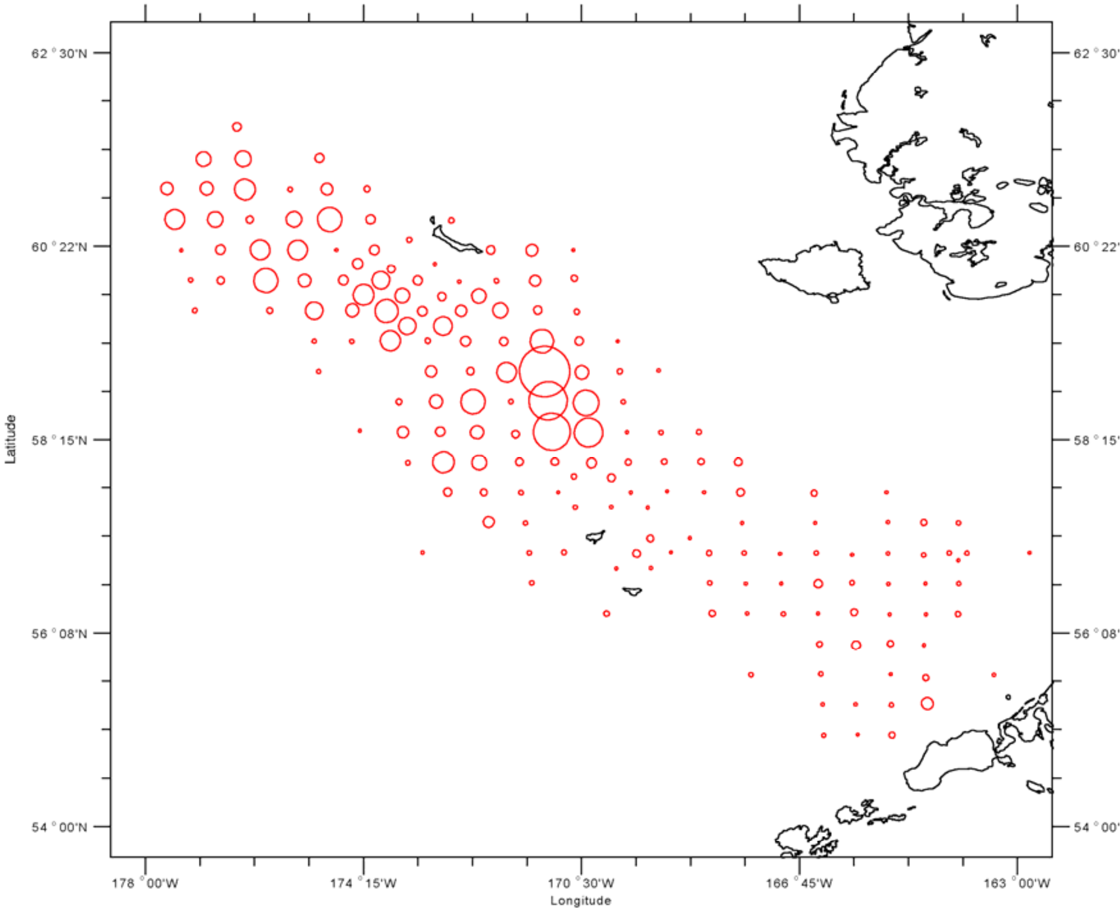

Figure 11. 2004 Survey abundance of males > 101 mm by tow. Abundance is proportional to the area of the circle.

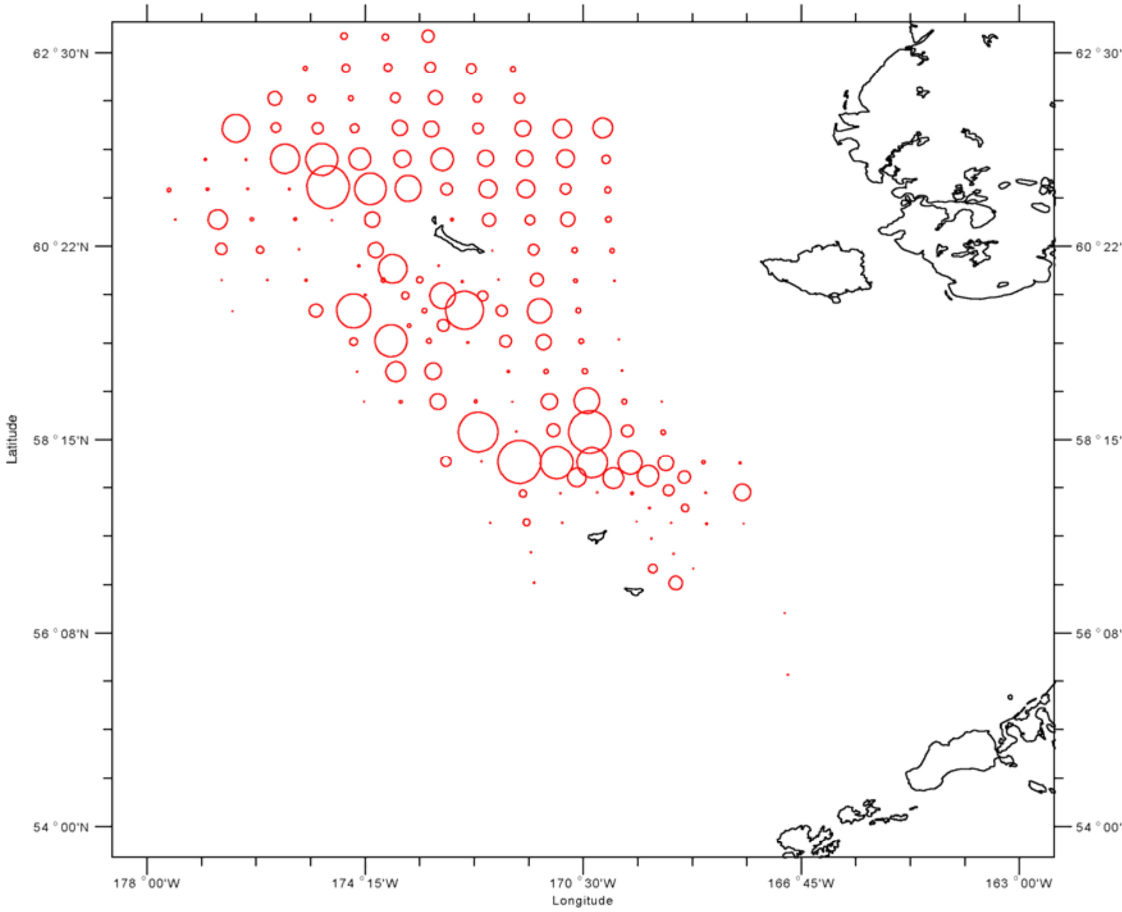

Figure 12. 2005 Survey abundance of females > 49 mm (approximately mature abundance) by tow. Abundance is proportional to the area of the circle (not on the same scale as male abundance in Figure 54). Includes stations to the north of the standard survey area.

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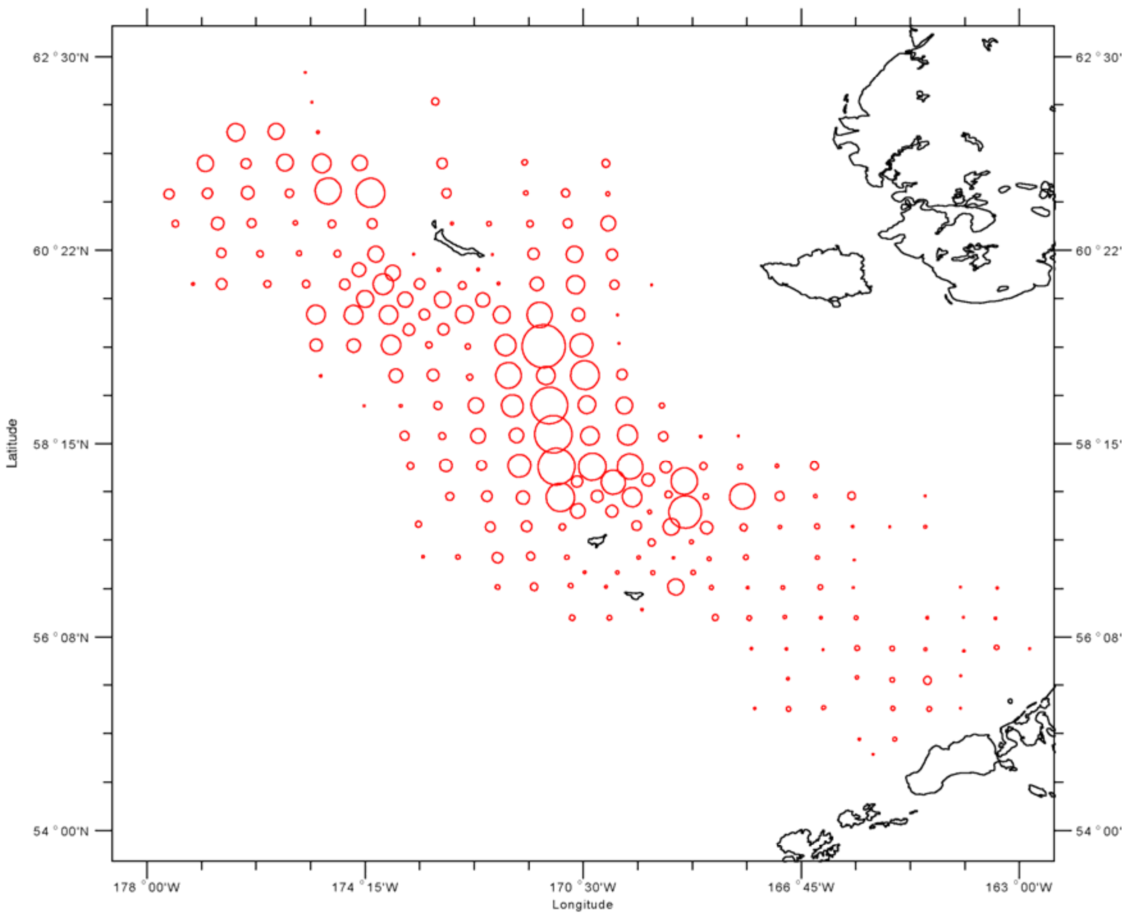

Figure 13. 2005 Survey abundance of males > 79 mm (approximately mature abundance) by tow. Abundance is proportional to the area of the circle (not on same scale as female abundance in Figure 53).

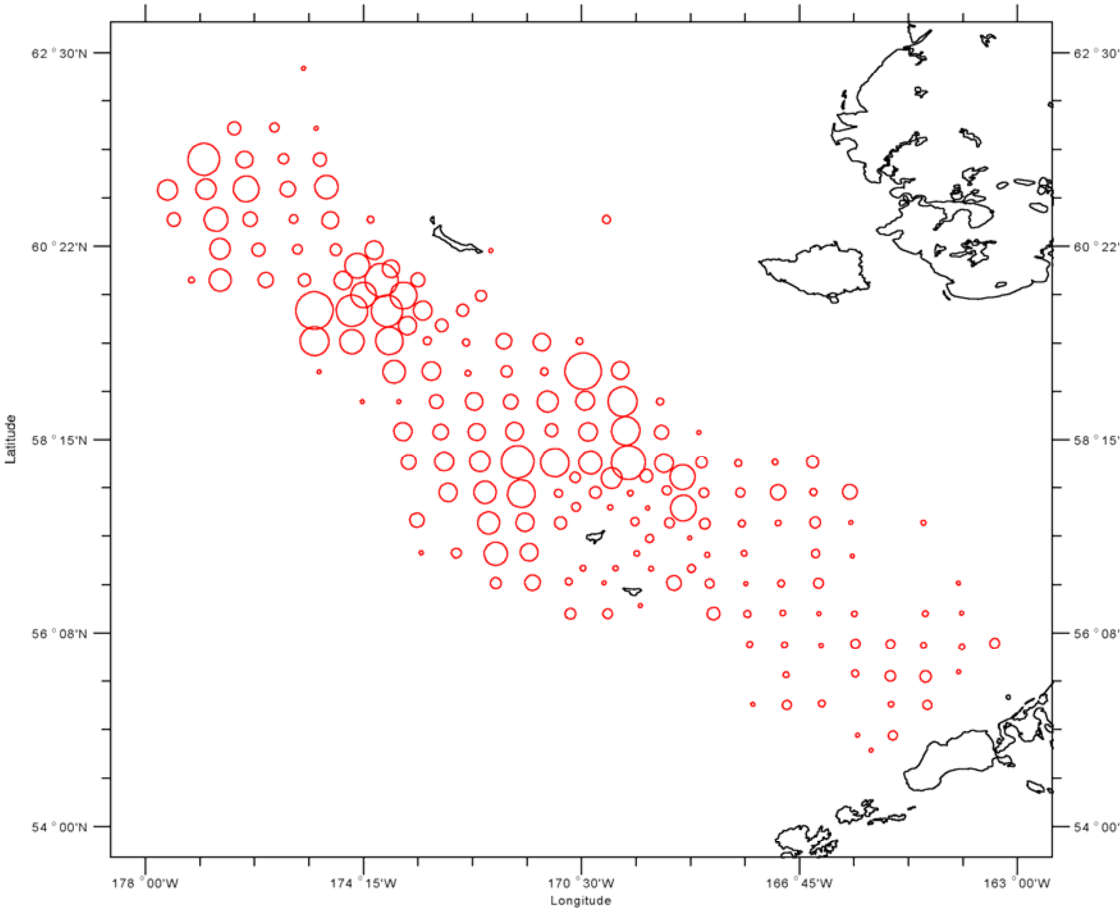

Figure 14. 2005 Survey abundance of males > 101 mm by tow. Abundance is proportional to the area of the circle.

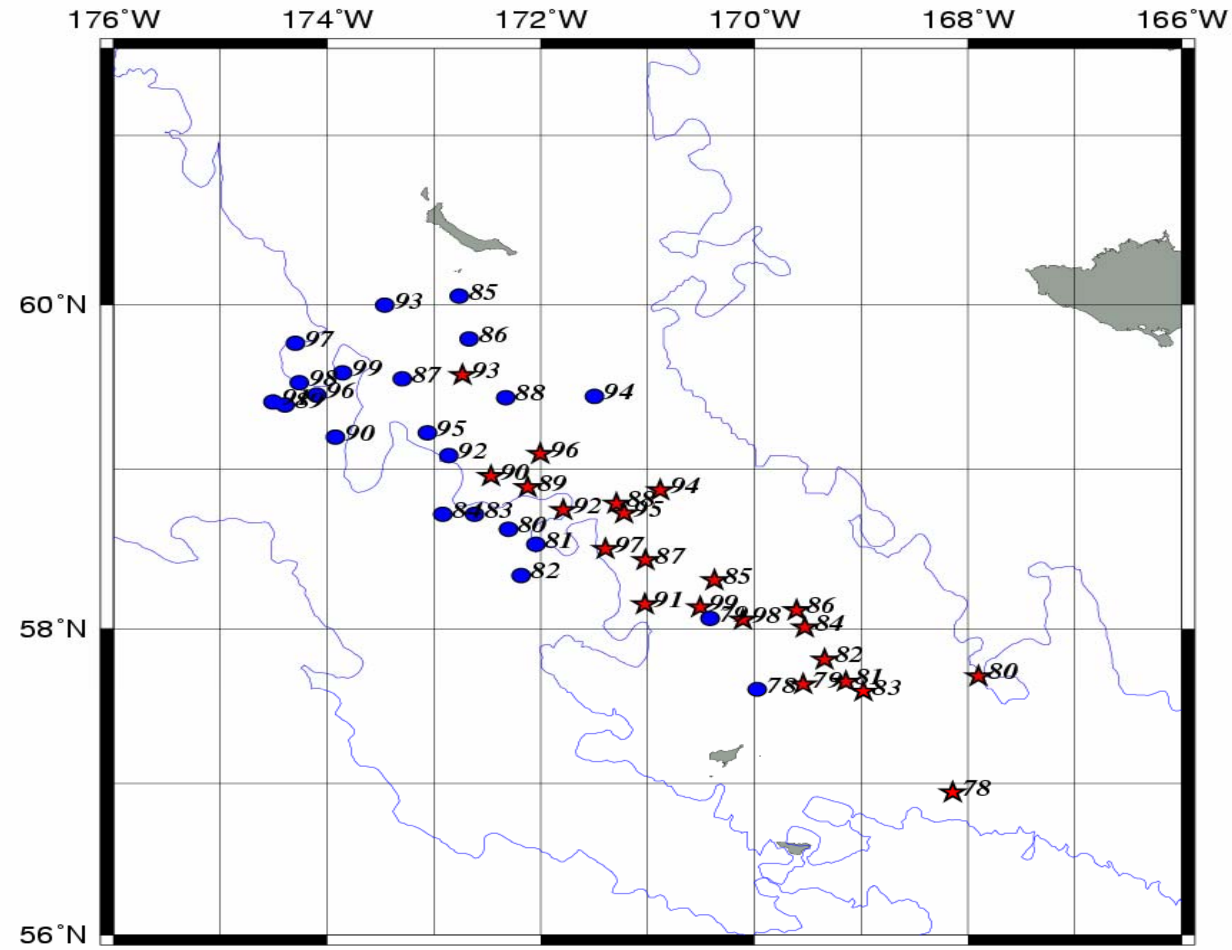

Figure 15. Centroids of abundance of mature female snow crabs (shell condition 2+) in blue circles and mature males (shell condition 3+) in red stars. Reprinted from Orensanz, Armstong and Ernst (in press).

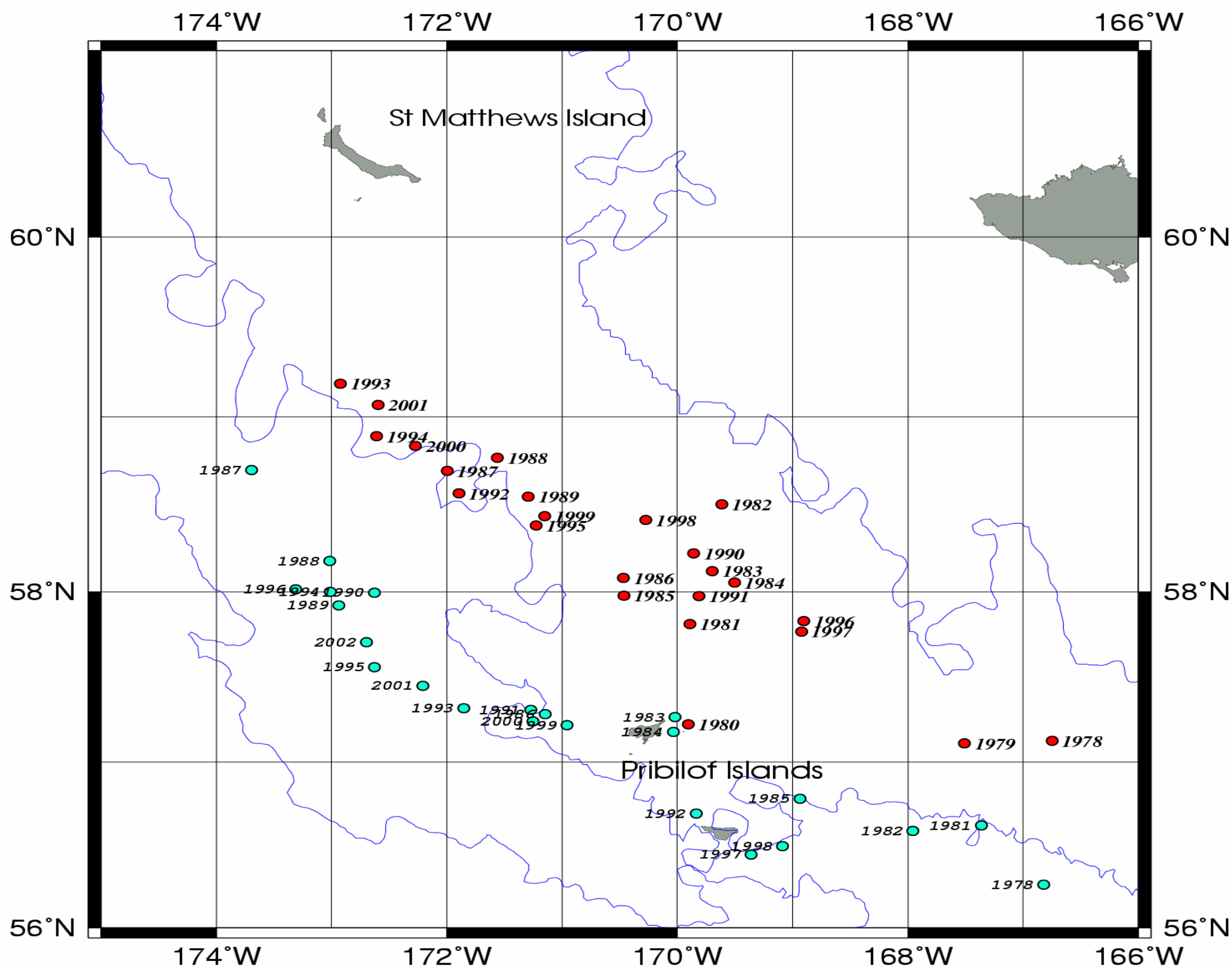

Figure 16. Centroids abundance (numbers) of snow crab males > 101 mm from the summer NMFS trawl survey (red) and from the winter fishery (blue-green), from Orensanz, Armstong and Ernst (in press).

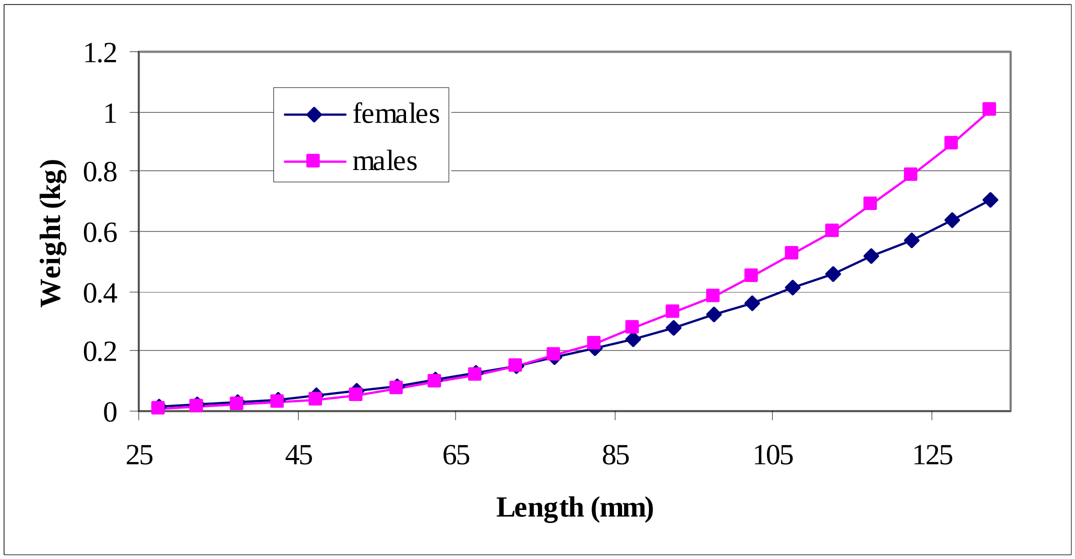

Figure 17. Weight (kg) – size (mm) relationship for male and female snow crab.

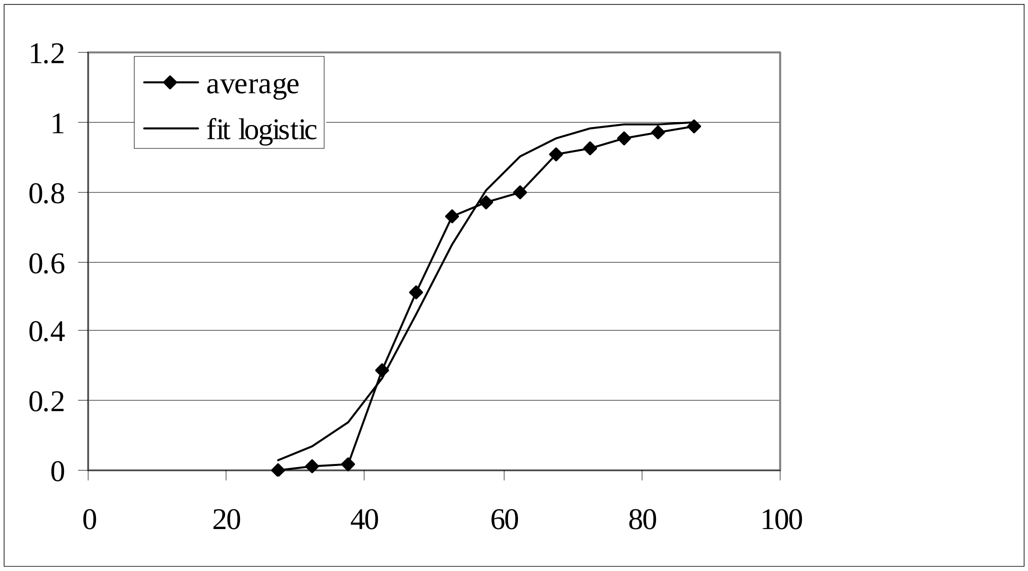

Figure 18. Average maturity for females from the survey 1978 to 2000 (not used in the model). Females were determined to be mature or immature based on visual examination in the survey. Line labeled logistic has a slope of 0.163 and size at 50% of 48.8 mm for comparison only.

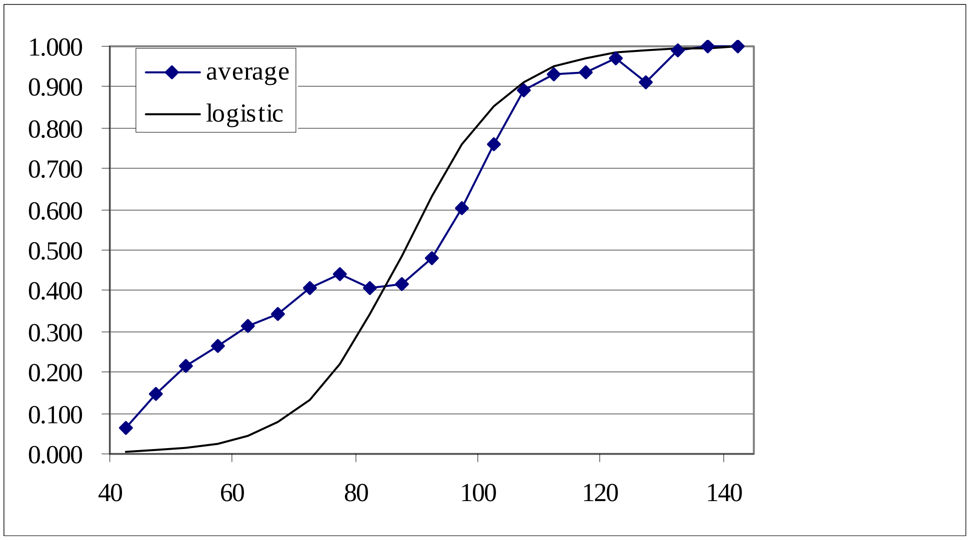

Figure 19. Maturity curve for new shell males. Line labeled average is the average maturity for new shell males from the survey 1989 to 2000. Line labeled logistic is the curve used in the model (slope 0.12, size at 50% 88.0mm).

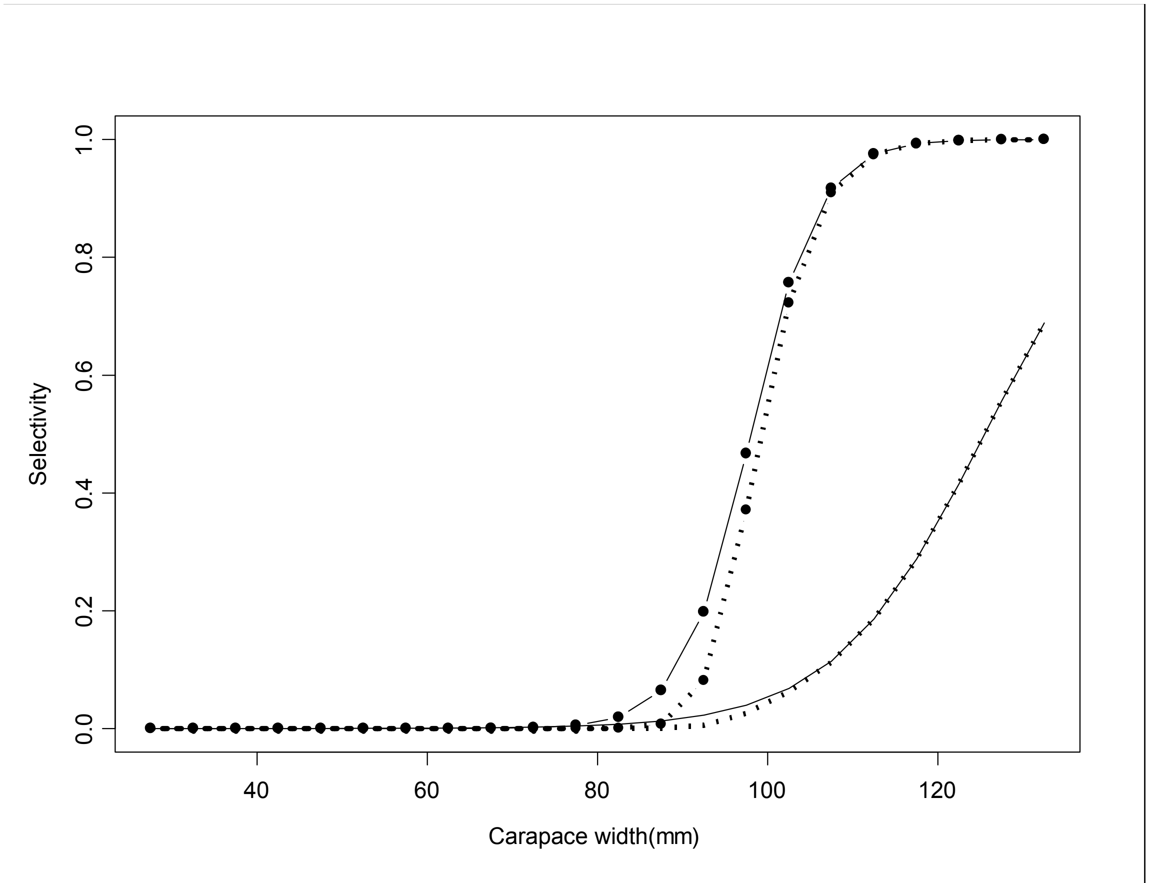

Figure 20. Average (for last 3 years) selectivity curve for total catch (discard plus retained) for new shell males (solid line with filled circles) and retained catch of male snow crab by new (dotted line with filled circles) and old shell condition (dotted line). Solid line is total selectivity (discard plus retained) for old shell males.

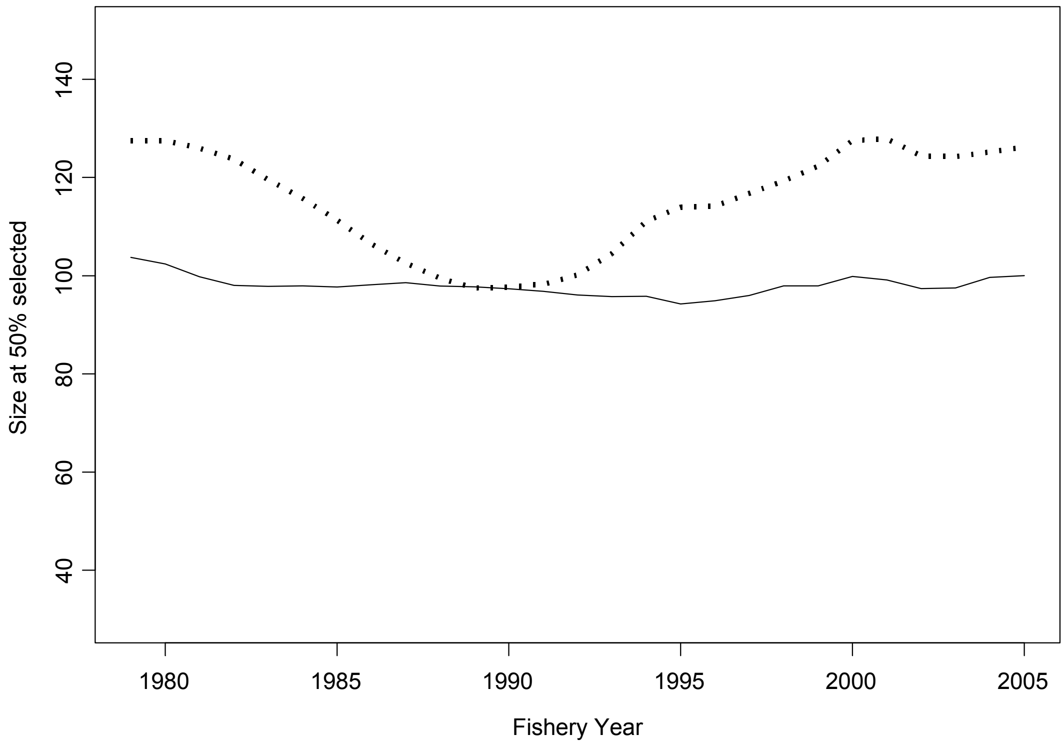

Figure 21. Size at 50% fishery selectivity for new shell (solid line) and old shell (dotted line).

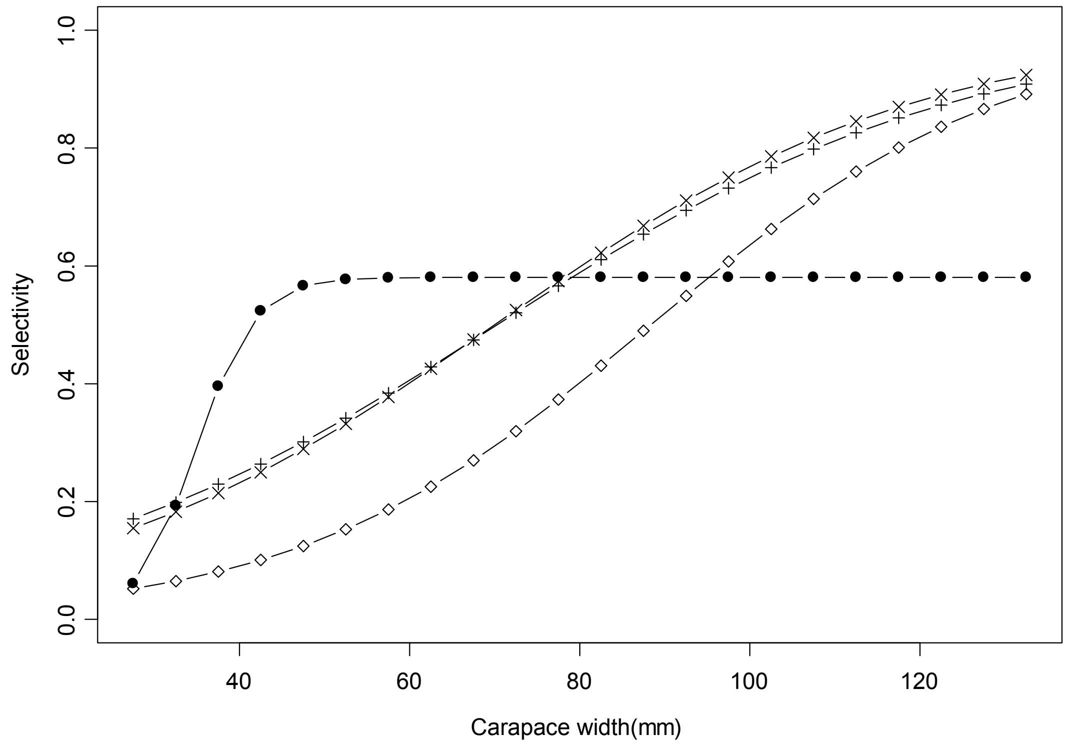

Figure 22. Survey selectivity curves for female and male snow crab estimated by the model for 1978-1981(solid line with circles), for 1982 to 1988 (solid line with diamonds), and 1989 to present (solid line with pluses). Survey selectivities estimated by Somerton and Otto (1998) are the solid line with crosses.

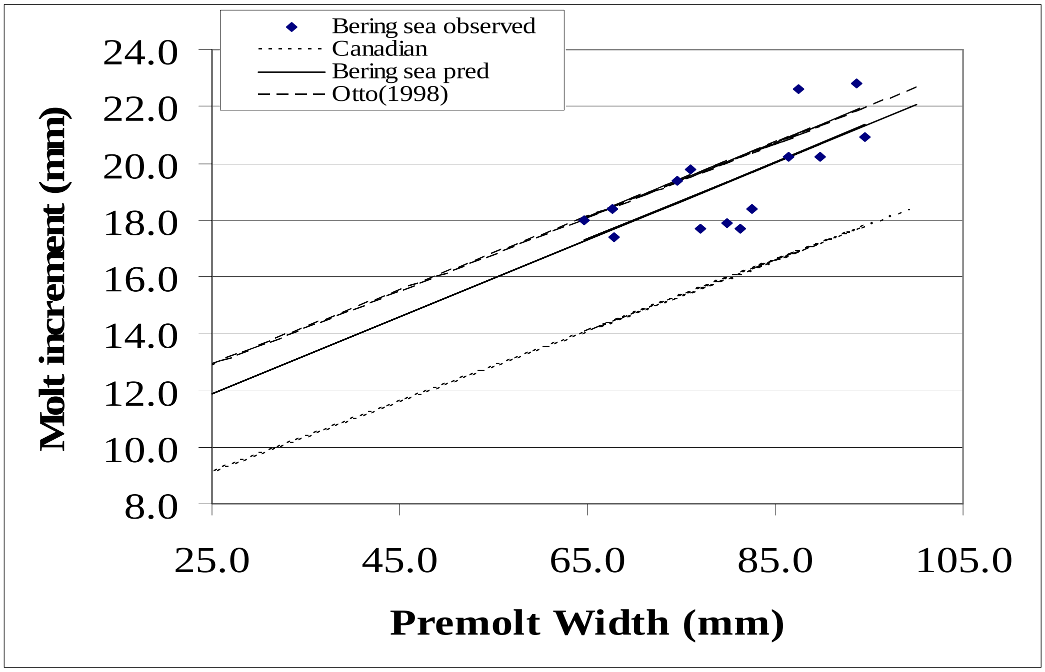

Figure 23. Growth increment as a function of premolt size for male snow crab. Points labeled Bering sea observed are observed growth increments from Rugolo (unpub data). The line labeled Bering sea pred is the predicted line from the Bering sea observed growth, which is used as a prior for the growth parameters estimated in the model. The line labeled Canadian is estimated from Atlantic snow crab (Sainte-Marie data). The line labeled Otto(1998) was estimated from tagging data from Atlantic snow crab less than 67 mm, from a different area from Sainte-Marie data.

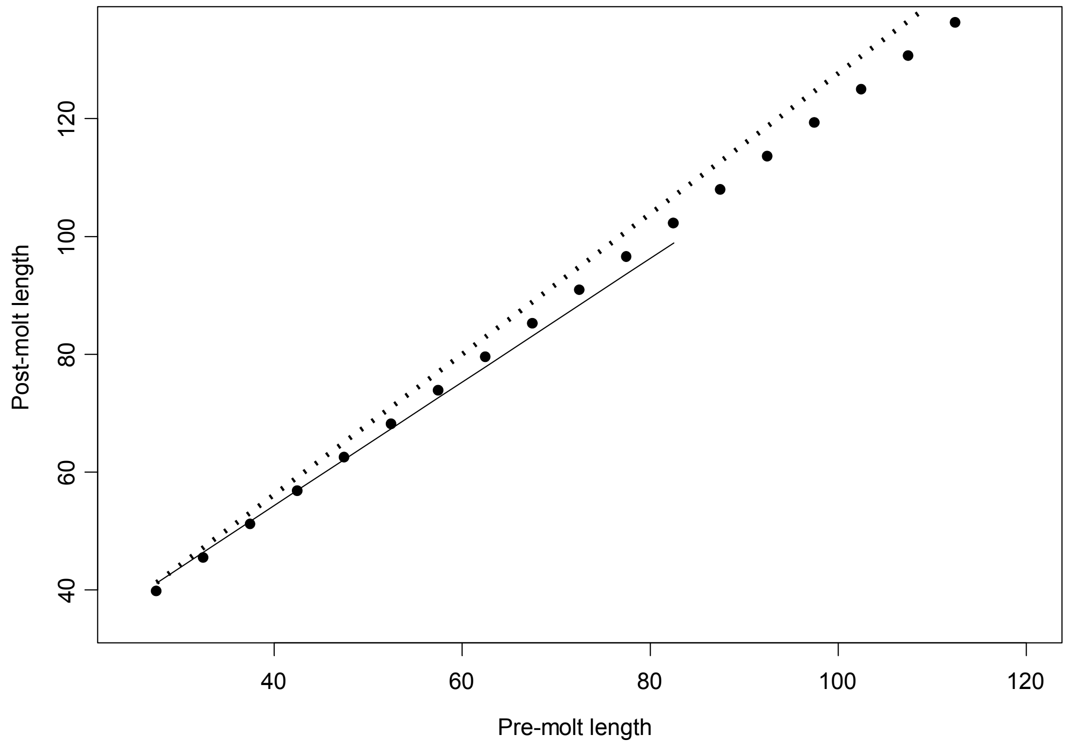

Figure 24. Growth(mm) for male(dotted line) and female snow crab (solid line) estimated from the model. Circles are the observed growth curve.

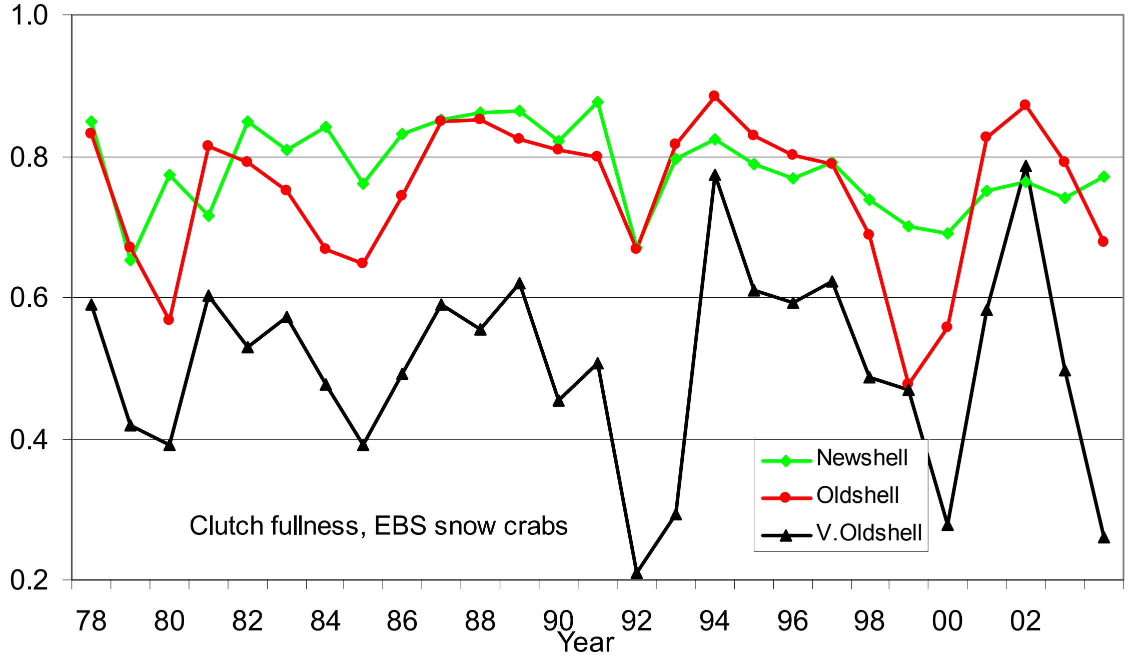

Figure 25. Clutch fullness for Bering sea snow crab survey data by shell condition for 1978 to 2004.

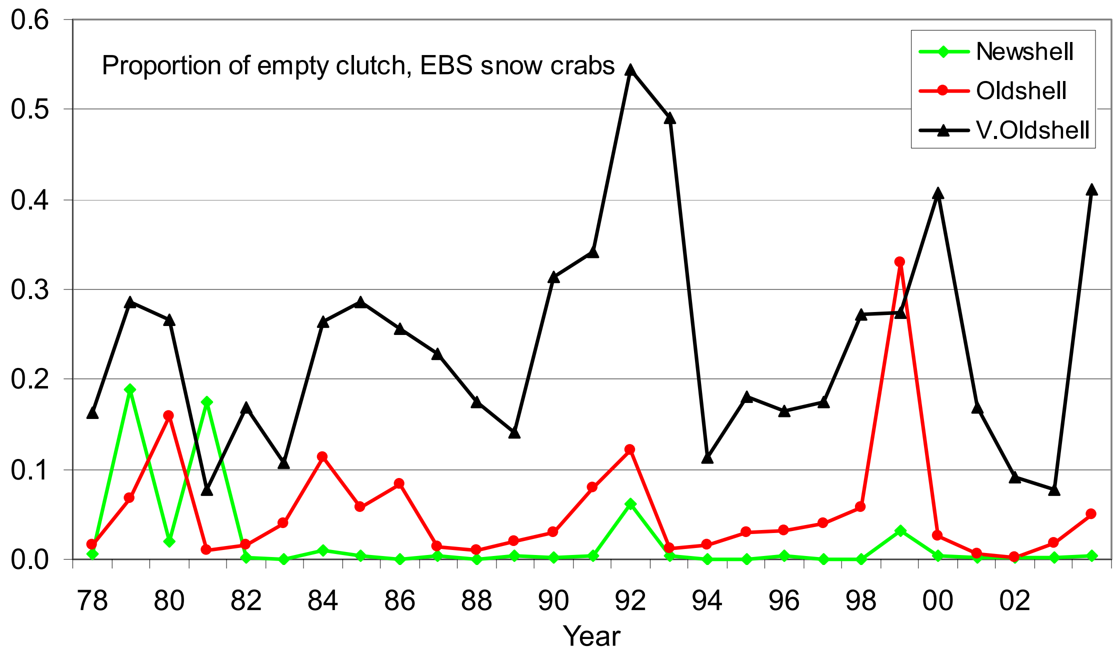

Figure 26. Proportion of barren females by shell condition from survey data 1978 to 2004.

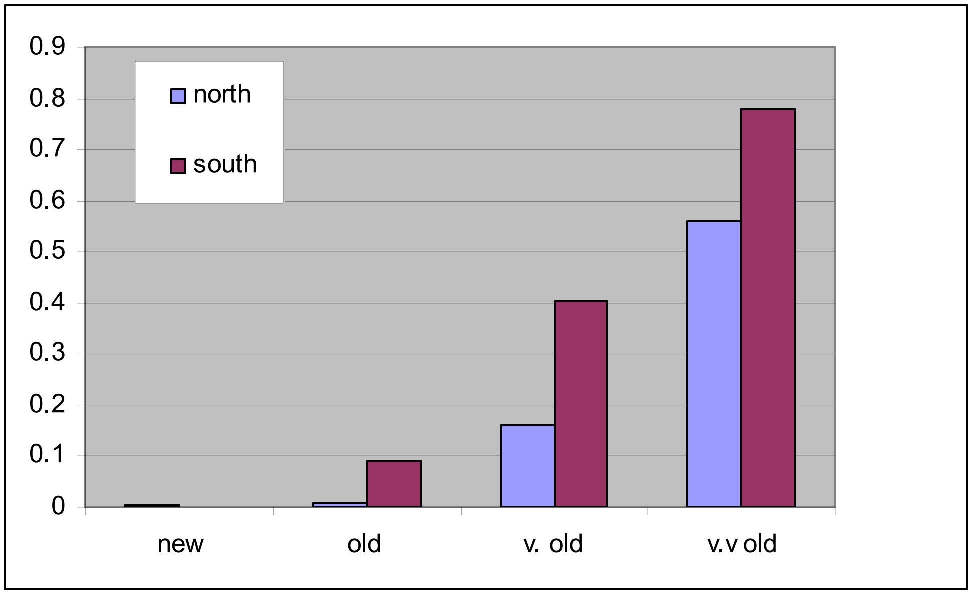

Figure 27. Fraction of barren females in the 2004 survey by shell condition and area north of 58.5 deg N and south of 58.5 deg N.

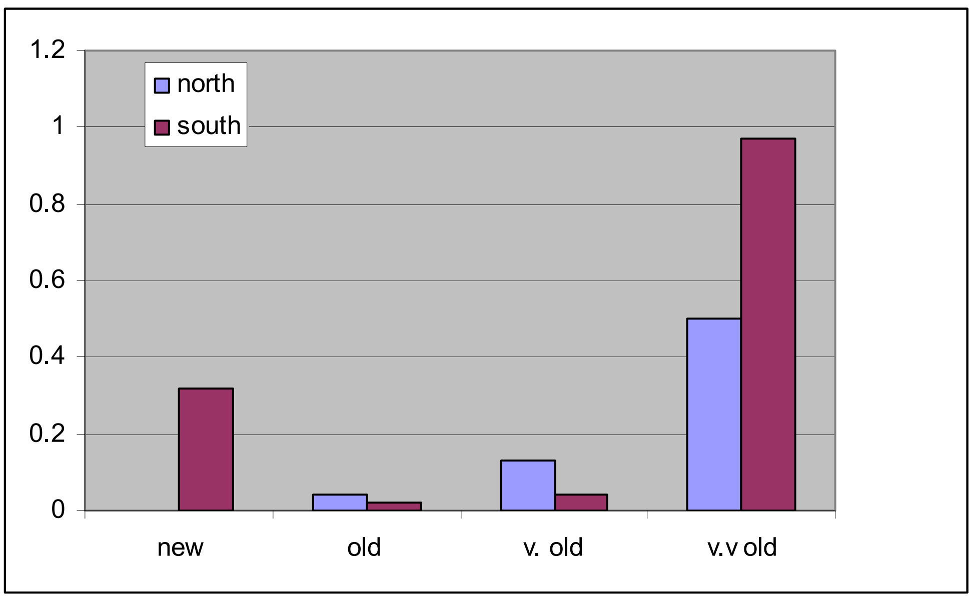

Figure 28. Fraction of barren females in the 2003 survey by shell condition and area north of 58.5 deg N and south of 58.5 deg N. The number of new shell mature females south of 58.5 deg N was very small in 2003.

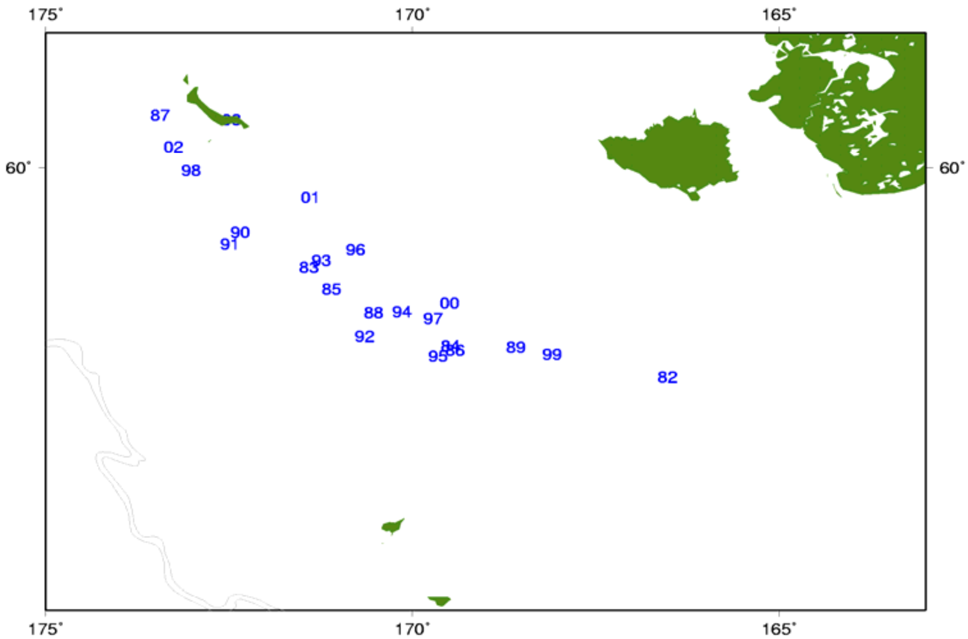

Figure 29. Centroids of cold pool (<2.0 deg C). Centroids are average latitude and longitude.

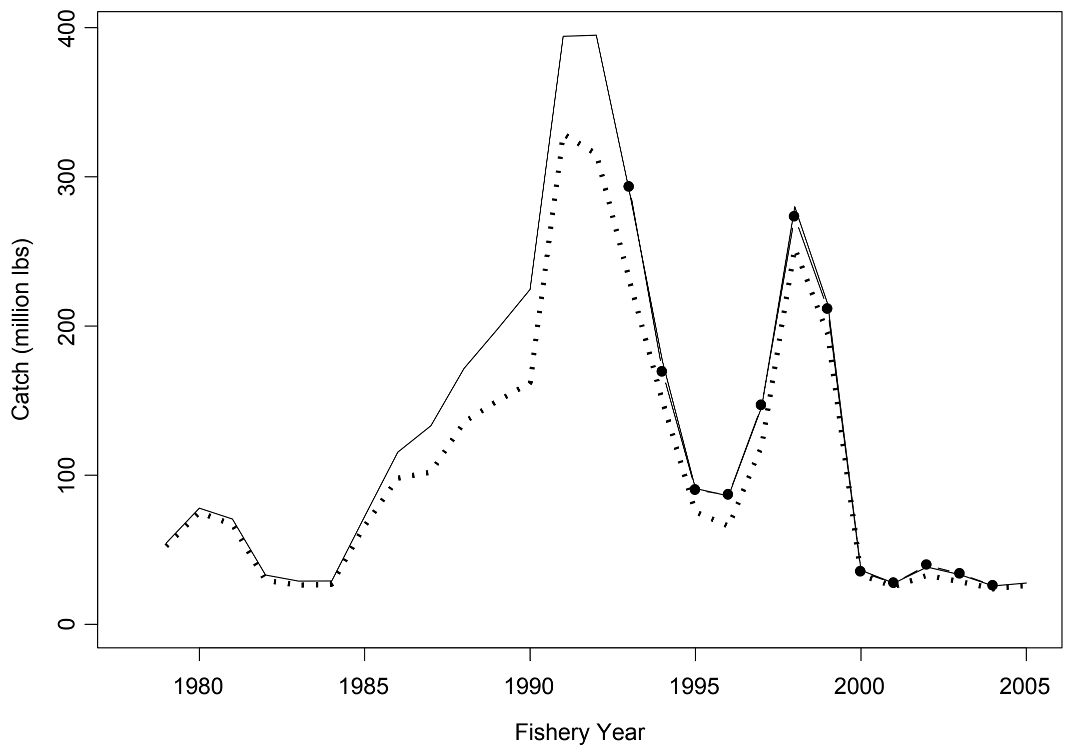

Figure 30. Estimated total catch(discard + retained) (solid line), observed total catch (solid line with circles) (assuming 50% mortality of discarded crab) and observed retained catch (dotted line) for 1978 to 2005 fishery seasons.

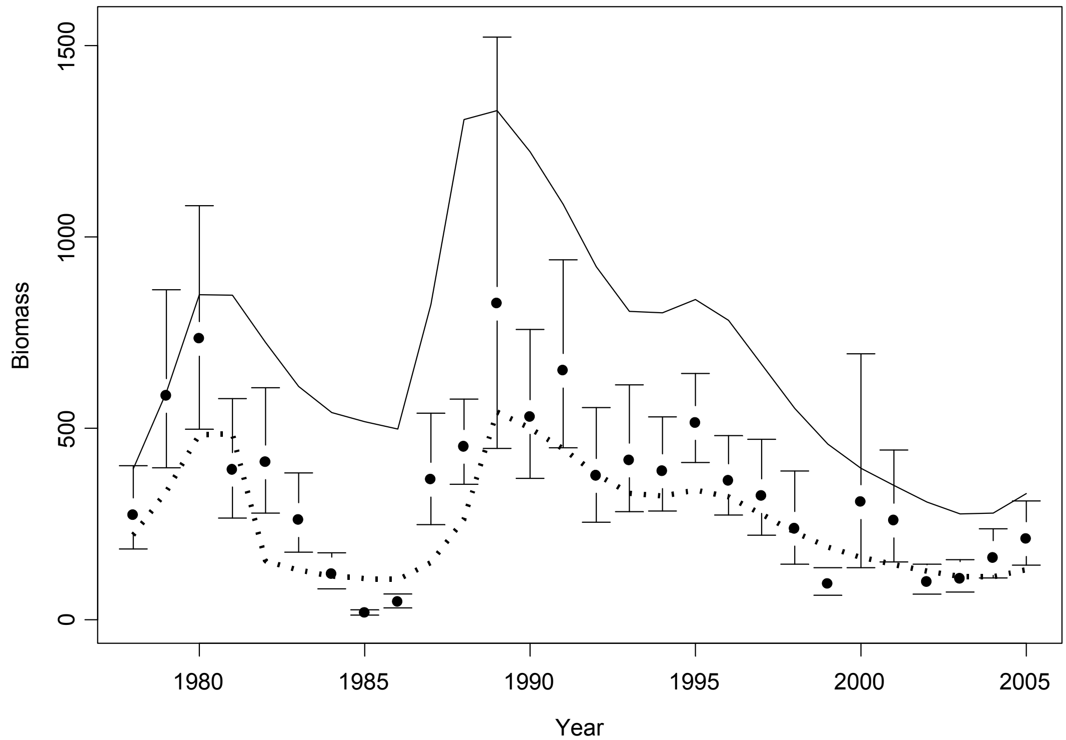

Figure 31. Population female mature biomass (millions of pounds, solid line), model estimate of survey female mature biomass (dotted line) and observed survey female mature biomass with approximate lognormal 95% confidence intervals.

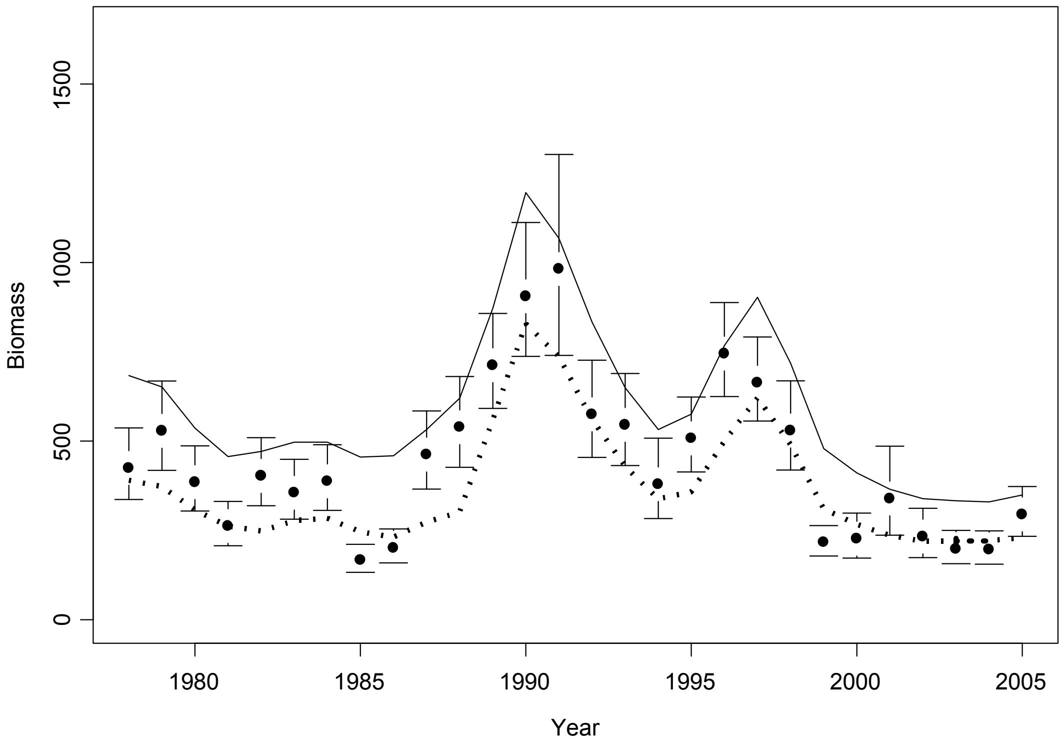

Figure 32. Population male mature biomass (millions of pounds, solid line), model estimate of survey male mature biomass (dotted line) and observed survey male mature biomass with approximate lognormal 95% confidence intervals.

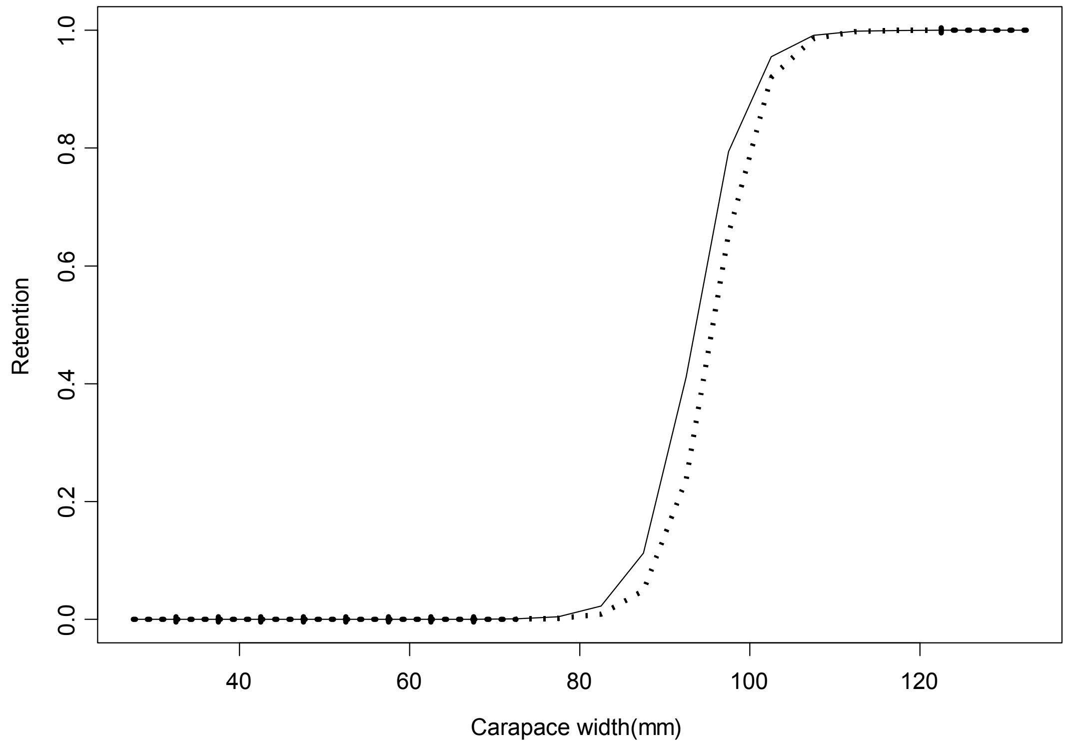

Figure 33. Model estimated fraction of the total catch that is retained by size for new(solid line) and old(dotted line) shell male snow crab.

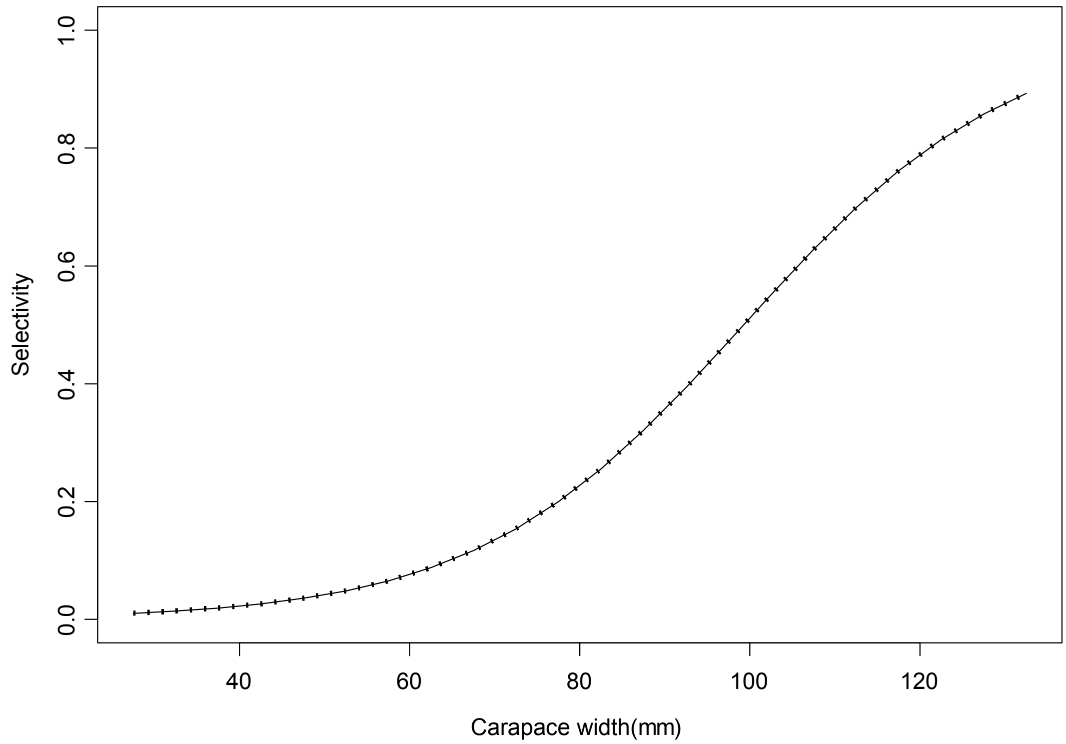

Figure 34. Selectivity curve estimated by the model for bycatch in the groundfish trawl fishery for females and males.

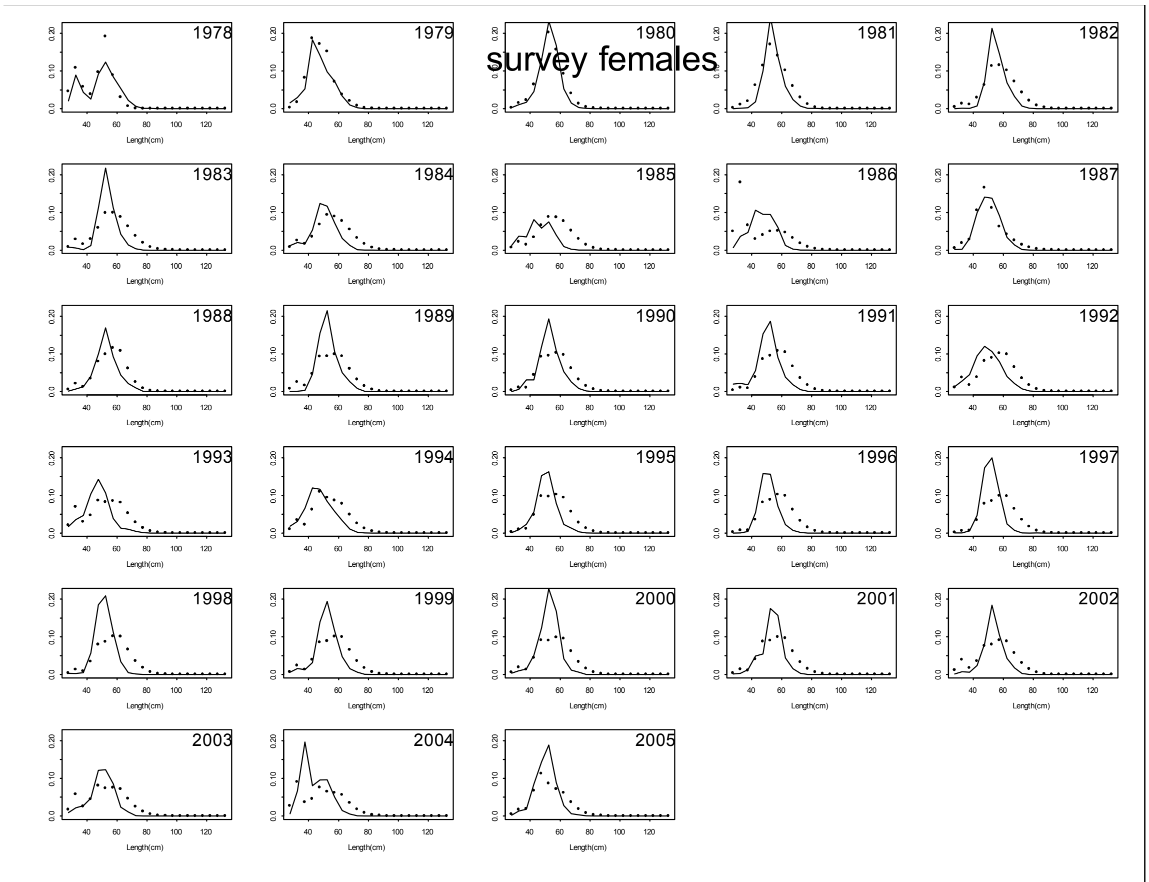

Figure 35. Model fit to the survey female size frequency data. Dotted line is the model fit.

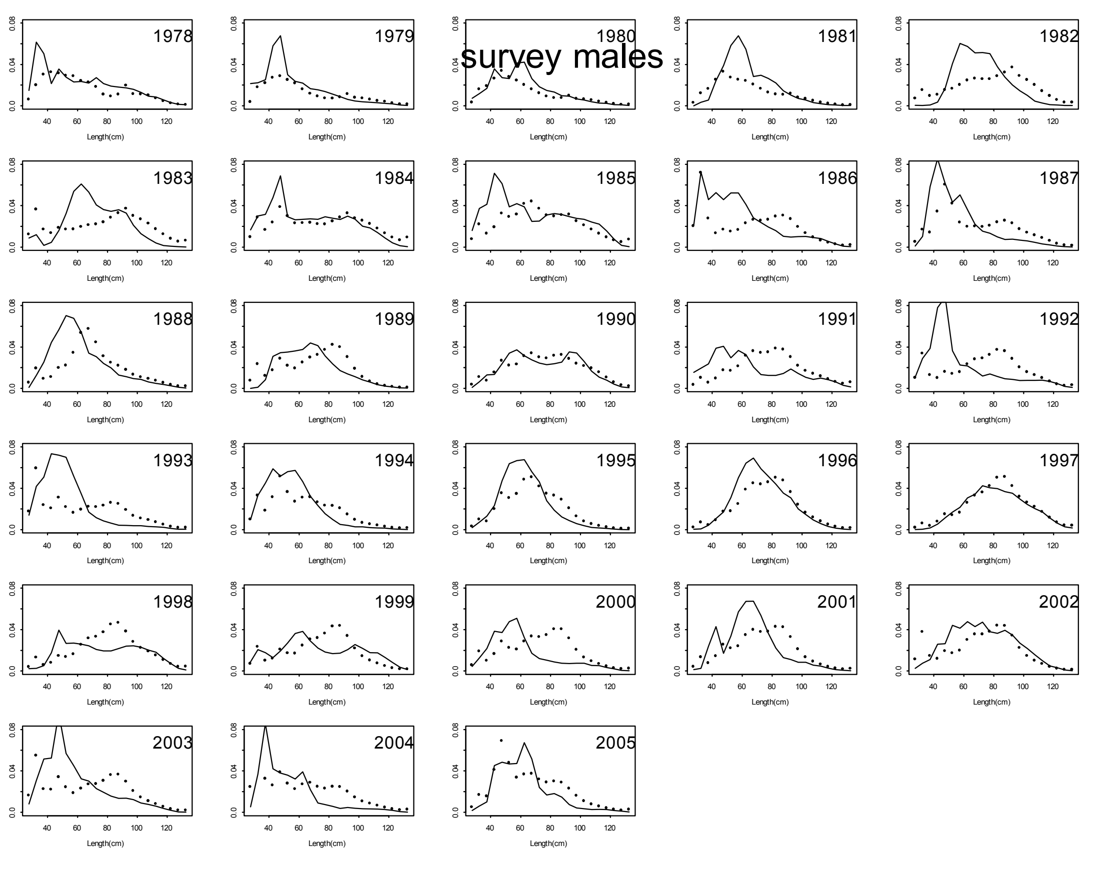

Figure 36. Model fit to the survey male size frequency data. Dotted line is the model fit.

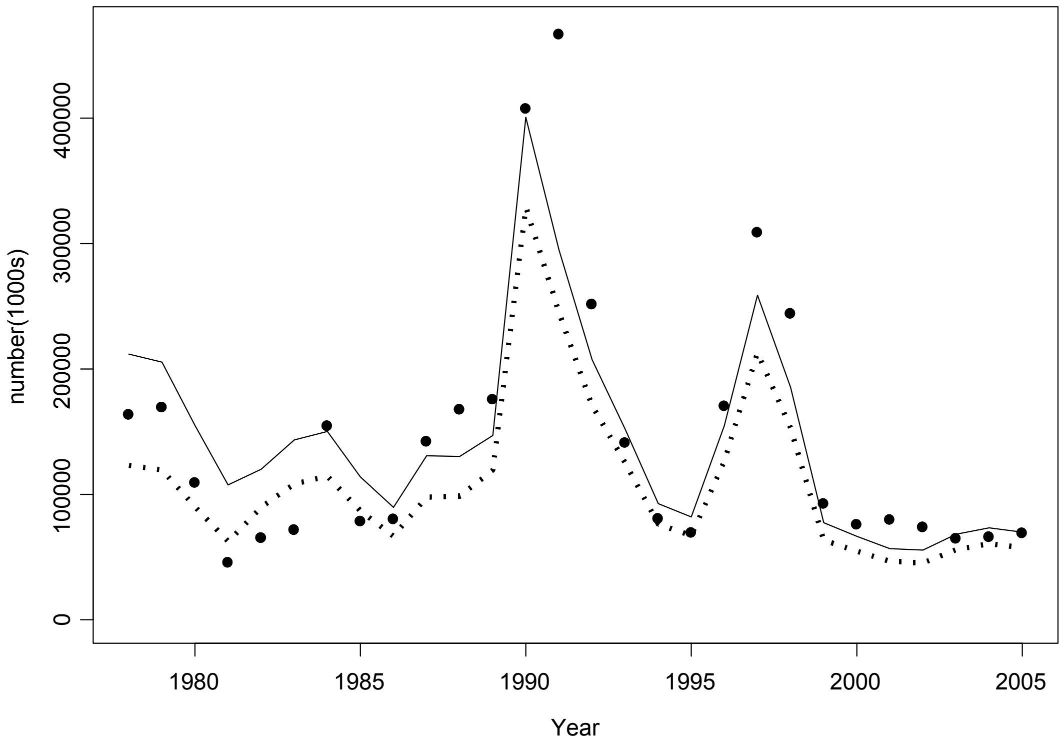

Figure 37. Observed survey numbers of males >101mm (circles) and model estimates of the population number of males >101mm(solid line) and model estimates of survey numbers of males >101 mm (dotted line).

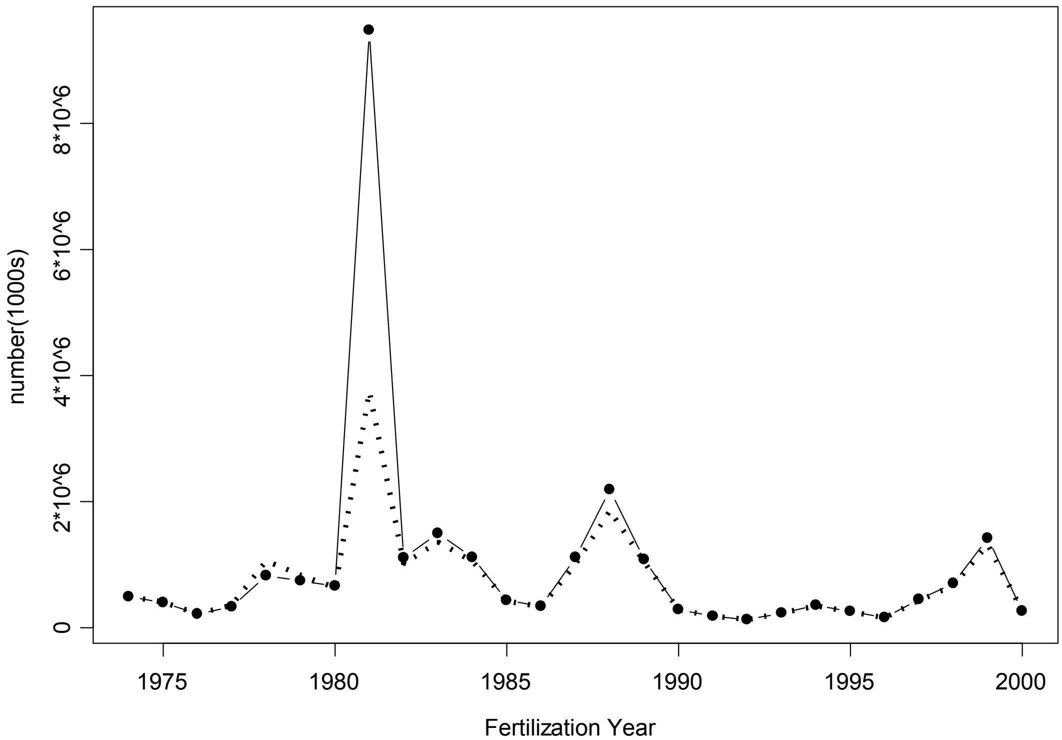

Figure 38. Recruitment to the model of male (dotted line) and female (solid line with dots) crab 25 mm to 50 mm.

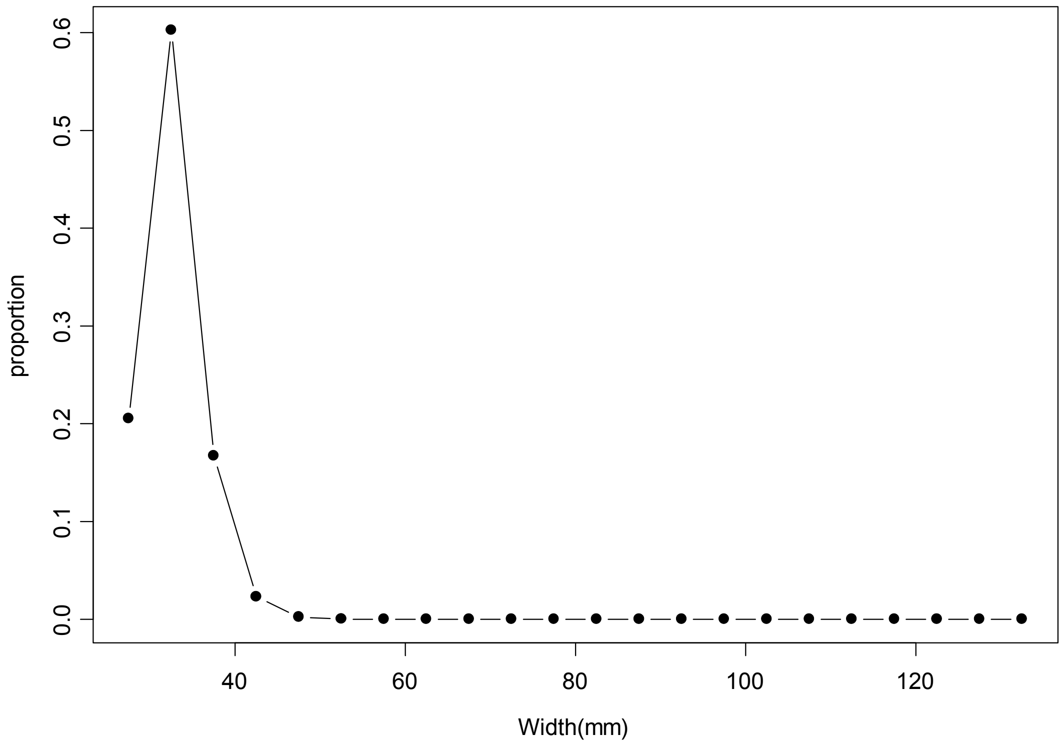

Figure 39. Distribution of recruits to length bins estimated by the model.

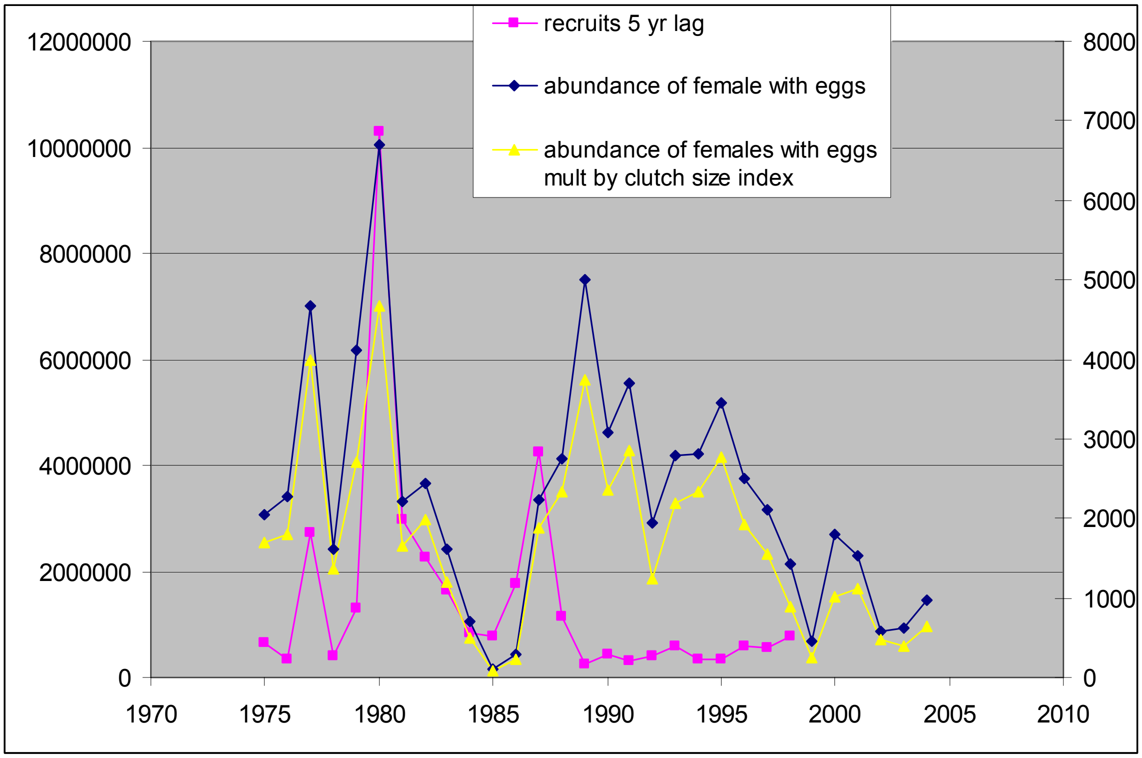

Figure 40. Model estimates of recruitment (fertilization year), survey abundance of females with eggs, and abundance of females with eggs multiplied by the fraction of full clutch from 1975 to 2004.

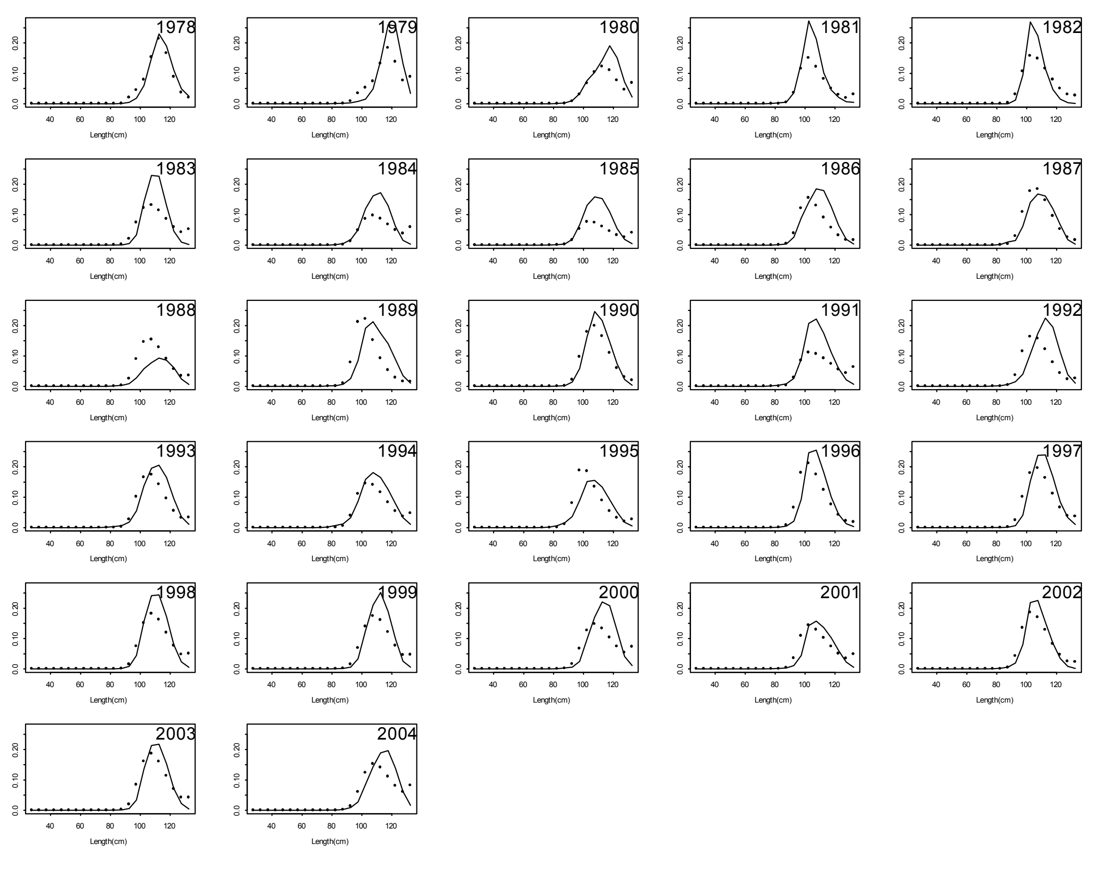

Figure 41. Model fit to the retained male new shell size frequency data. Dotted line is the model fit. Year is the survey year.

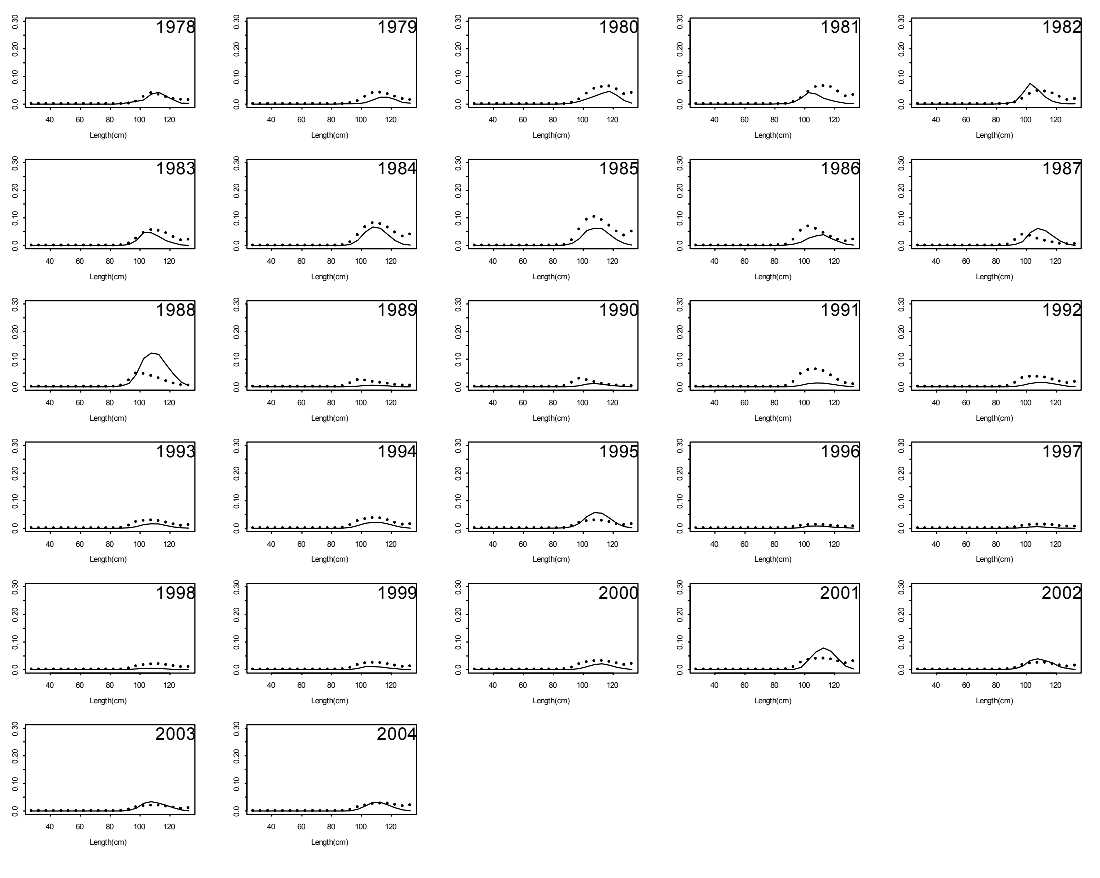

Figure 42. Model fit to the retained male old shell size frequency data. Dotted line is the model fit. Year is the survey year.

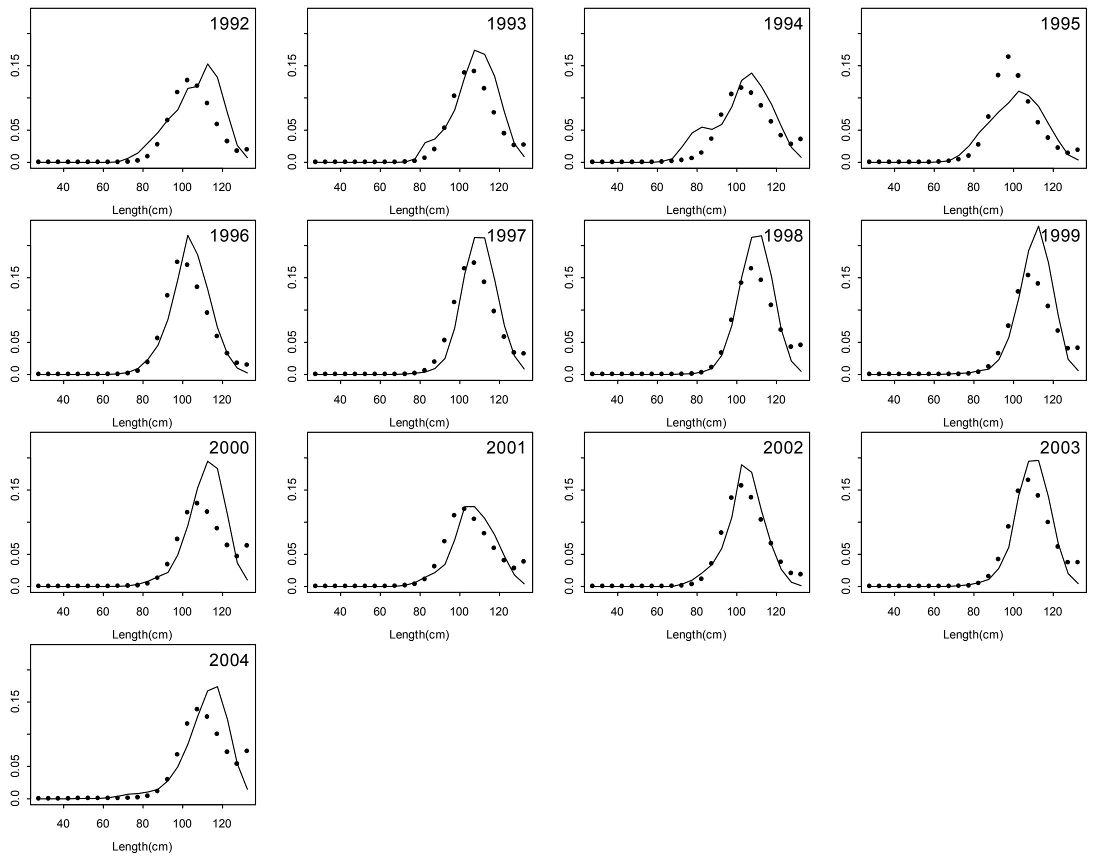

Figure 43. Model fit to the total (discard plus retained) male new shell size frequency data. Dotted line is the model fit. Year is the survey year.

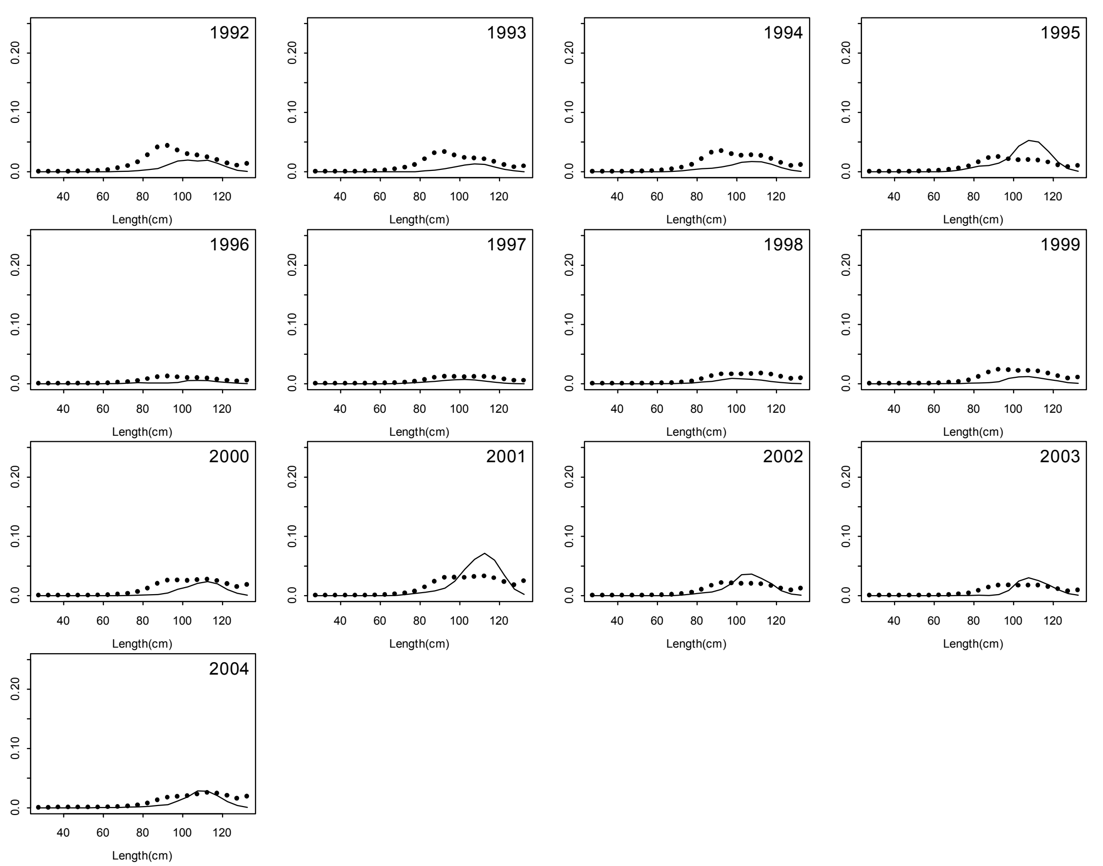

Figure 44. Model fit to the total (discard plus retained) male old shell size frequency data. Dotted line is the model fit. Year is the survey year.

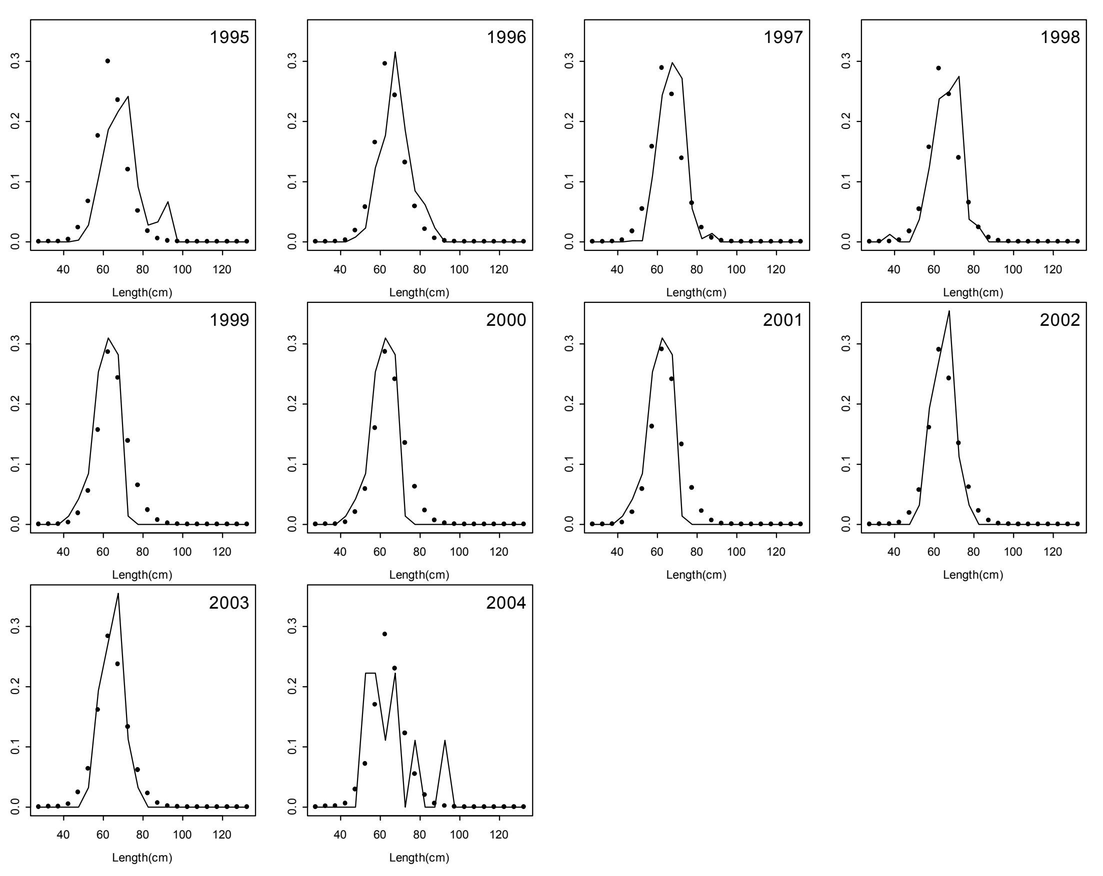

Figure 45. Model fit to the discard female size frequency data. Dotted line is the model fit. Year is the survey year.

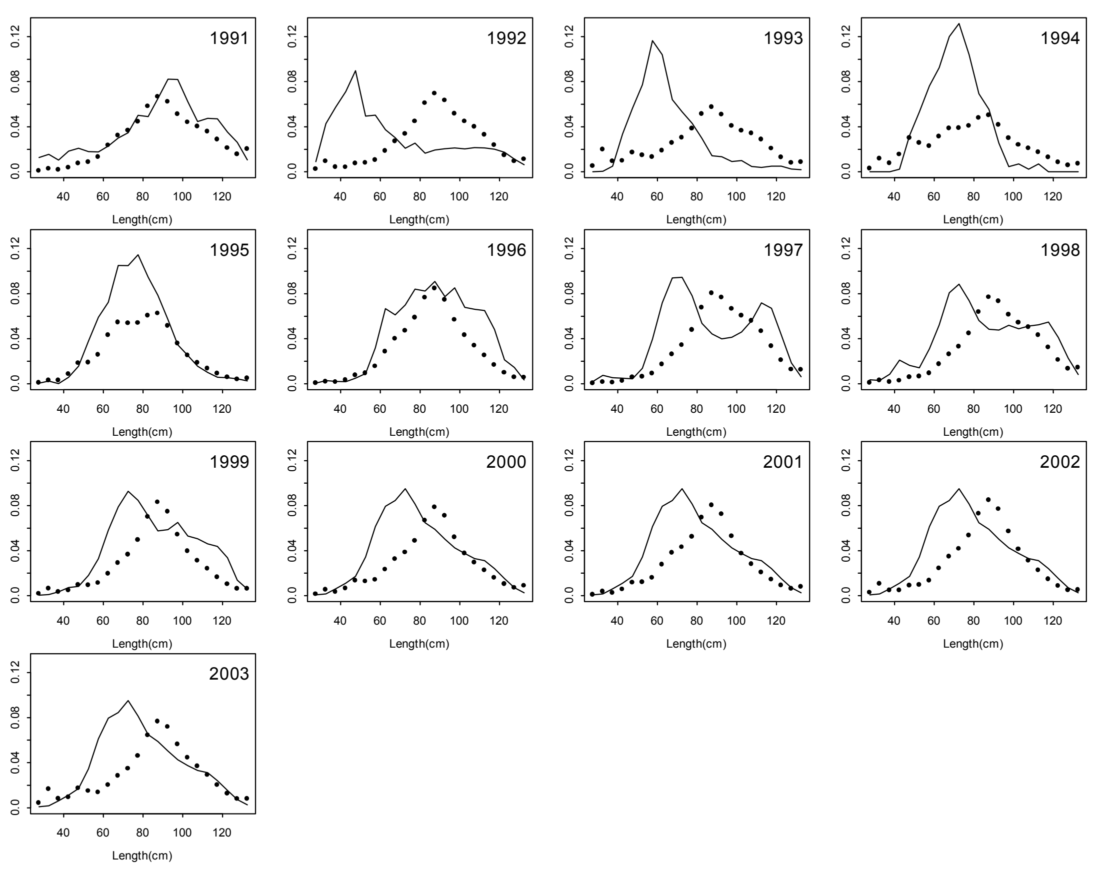

Figure 46. Model fit to the groundfish trawl discard male size frequency data. Dotted line is the model fit. Year is the survey year.

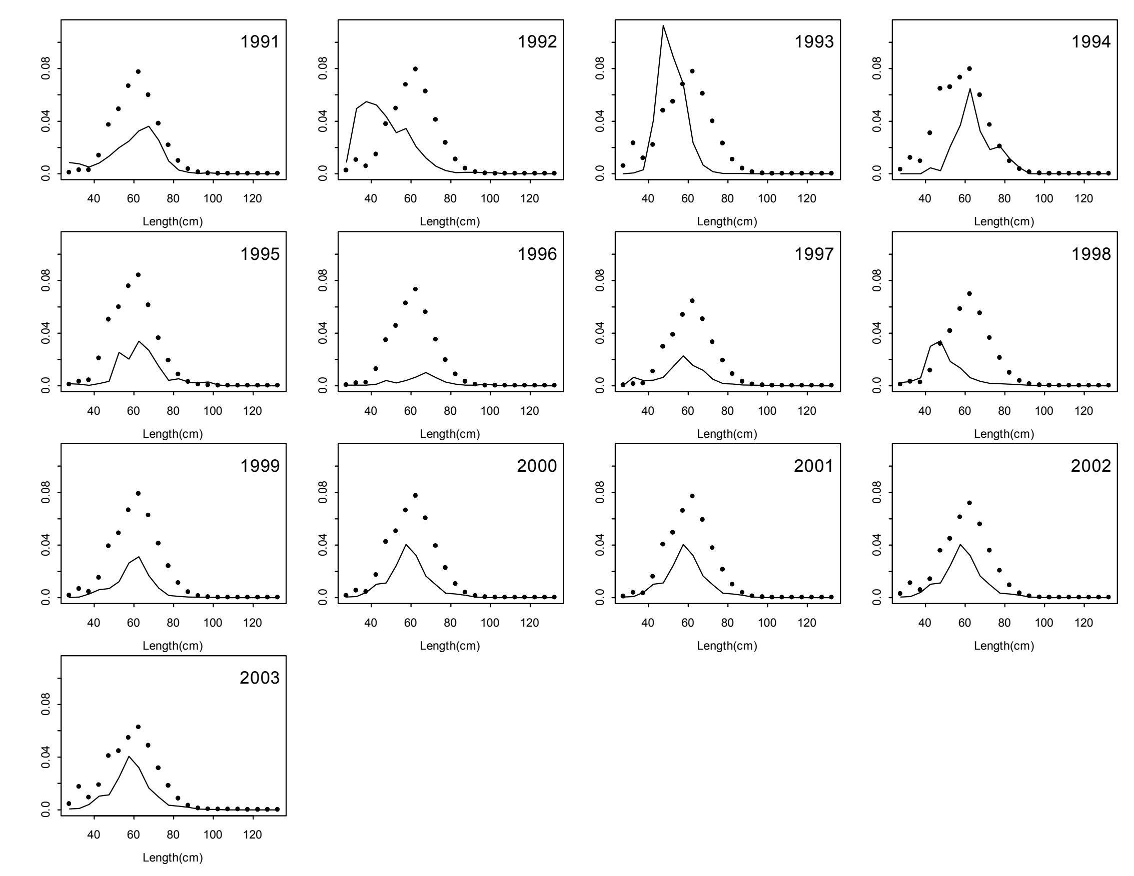

Figure 47. Model fit to the groundfish trawl discard female size frequency data. Dotted line is the model fit.

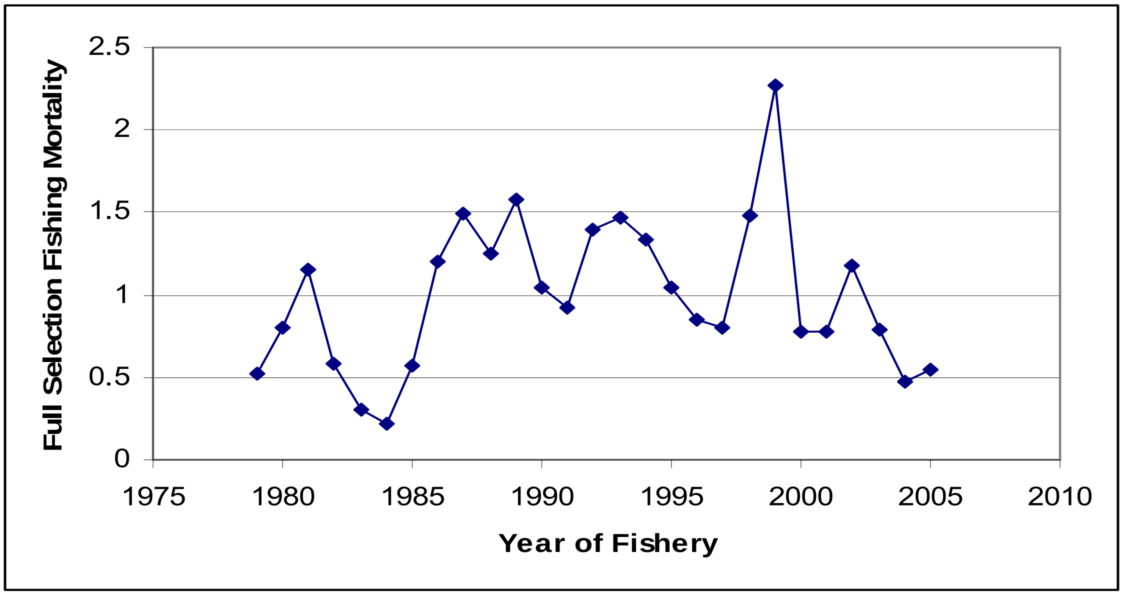

Figure 48. Full selection fishing mortality estimated in the model from 1979 to 2005 fishery seasons.

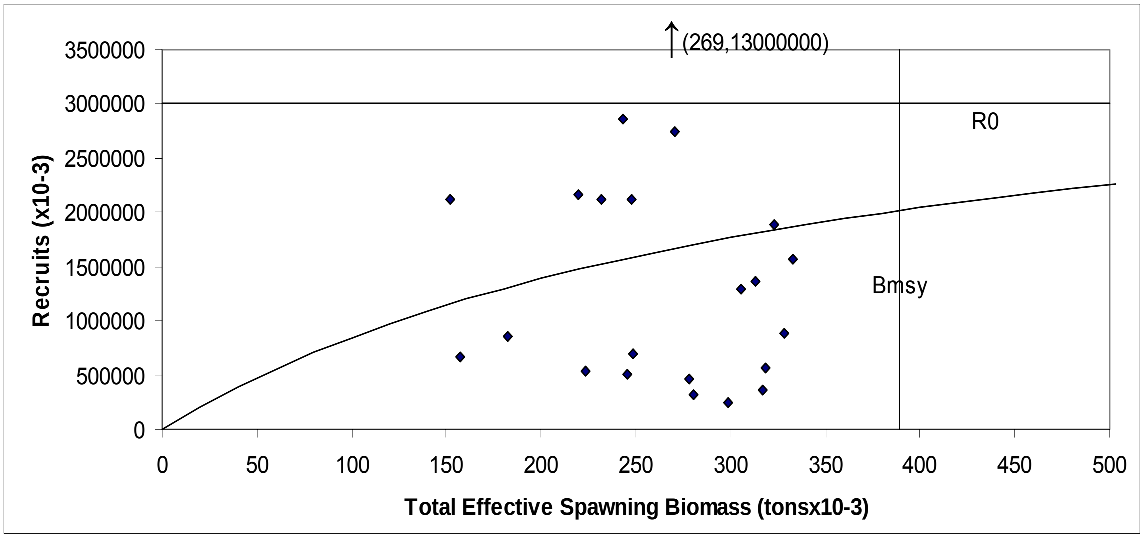

Figure 49. Spawner recruit curve using total effective spawning biomass at time of mating. Curve has a steepness parameter of 0.54 and R0 of 3.0 billion recruits.

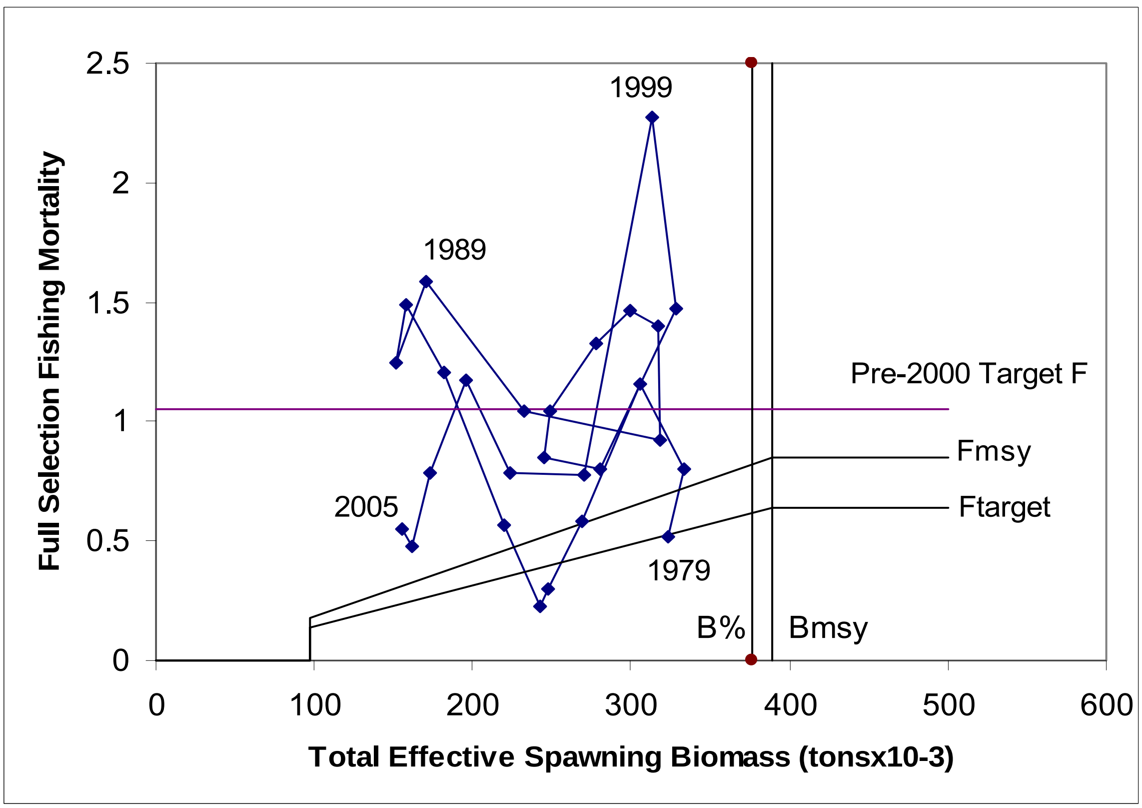

Figure 50. Harvest control rules. The line labeled Fmsy is the harvest control rule using Fmsy as the maximum F, with Bmsy = 389 tonsx10-3 and alpha = 0.05. The lower line labeled Ftarget is for target harvest control rule, where the maximum F = 0.75*Fmsy. The pre-2000 target F of about 1.05 was the target F that resulted from the harvest strategy used before the 2000 fishery season. Vertical line labeled B% is the proxy value of Bmsy estimated from the product of spawning biomass per recruit fishing at Fmsy and mean recruitment from the stock assessment model. The vertical line to the right of B% line is Bmsy estimated using the spawner recruit curve.

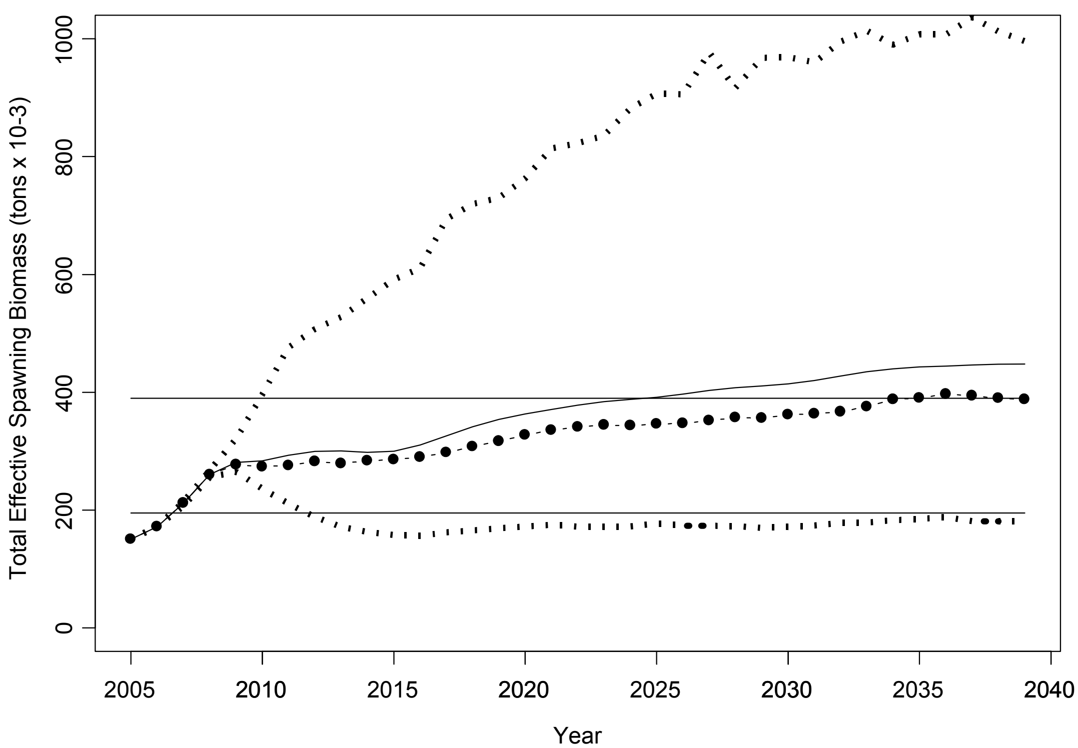

Figure 51. Projection of total effective spawning biomass (TESB) fishing at the Ftarget control rule. Year is the survey year. Solid line is the mean TESB, line with dots is the median TESB, and dotted lines are the 95% probability intervals. The upper horizontal line is Bmsy and the lower ½ Bmsy. The upper horizontal line is Bmsy and the lower ½ Bmsy.

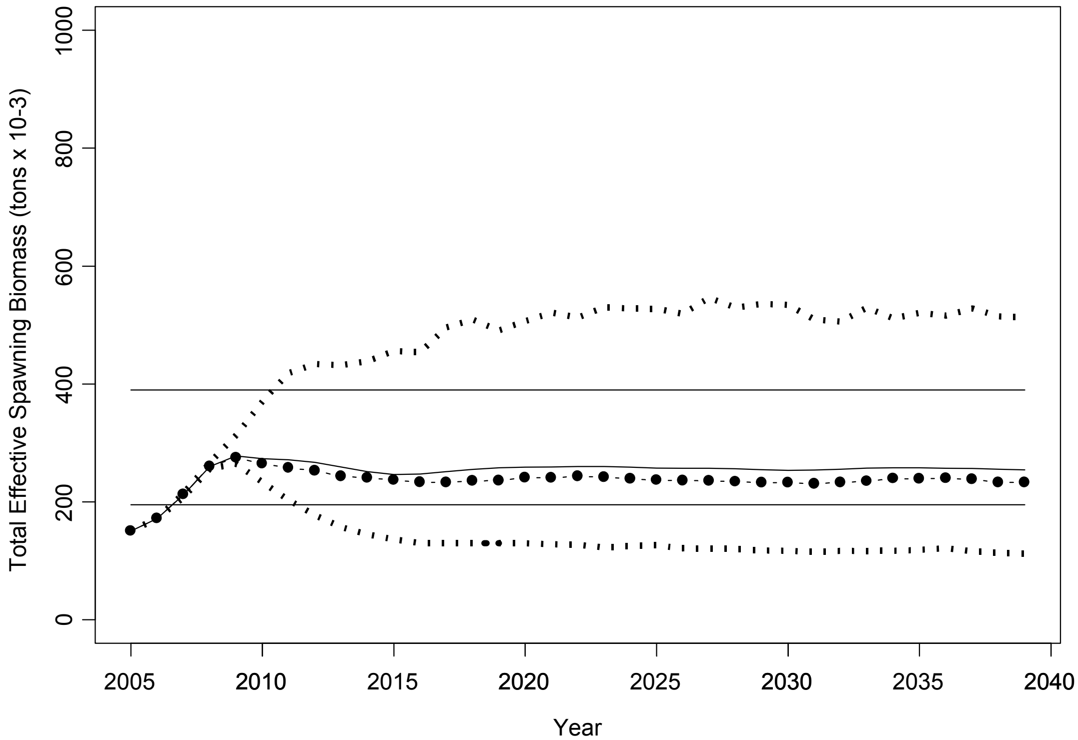

Figure 52. Projection of total effective spawning biomass (TESB) fishing at the Ftarget control rule, with mean recruitment similar to the last 10 years. Year is the survey year. Solid line is the mean TESB, line with dots is the median TESB, and dotted lines are the 95% probability intervals. The upper horizontal line is Bmsy and the lower ½ Bmsy. The upper horizontal line is Bmsy and the lower ½ Bmsy.

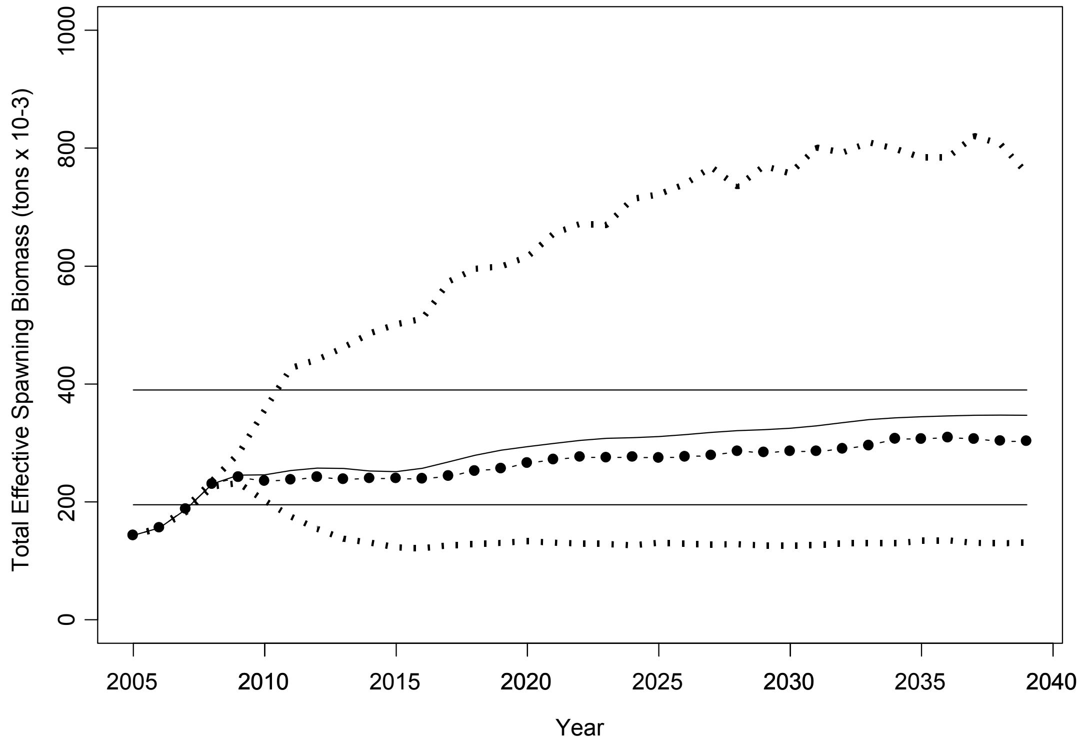

Figure 53. Projection of total effective spawning biomass (TESB) fishing at the current harvest control rule. Year is the survey year. Solid line is the mean TESB, line with dots is the median TESB, and dotted lines are the 95% probability intervals. The upper horizontal line is Bmsy and the lower ½ Bmsy. The upper horizontal line is Bmsy and the lower ½ Bmsy. There is a 0.12 probability of falling below 1/2 Bmsy.

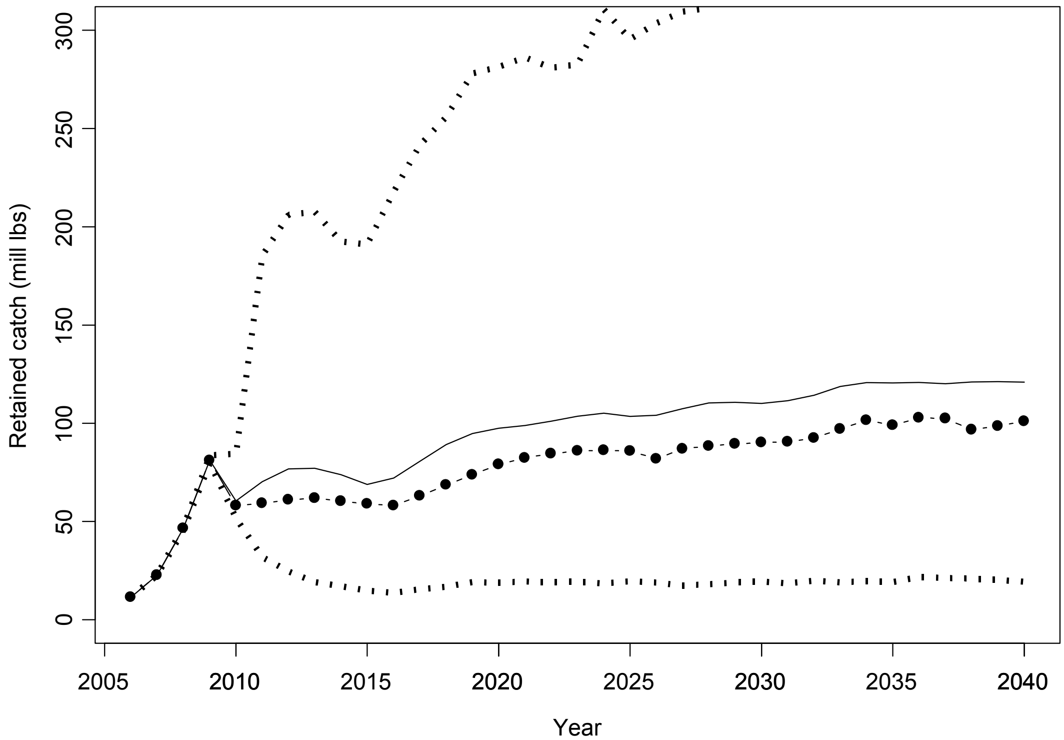

Figure 54. Projection of retained catch fishing at the Ftarget control rule. Solid line is the mean retained catch, line with dots is the median retained catch, and dotted lines are the 95% probability intervals.

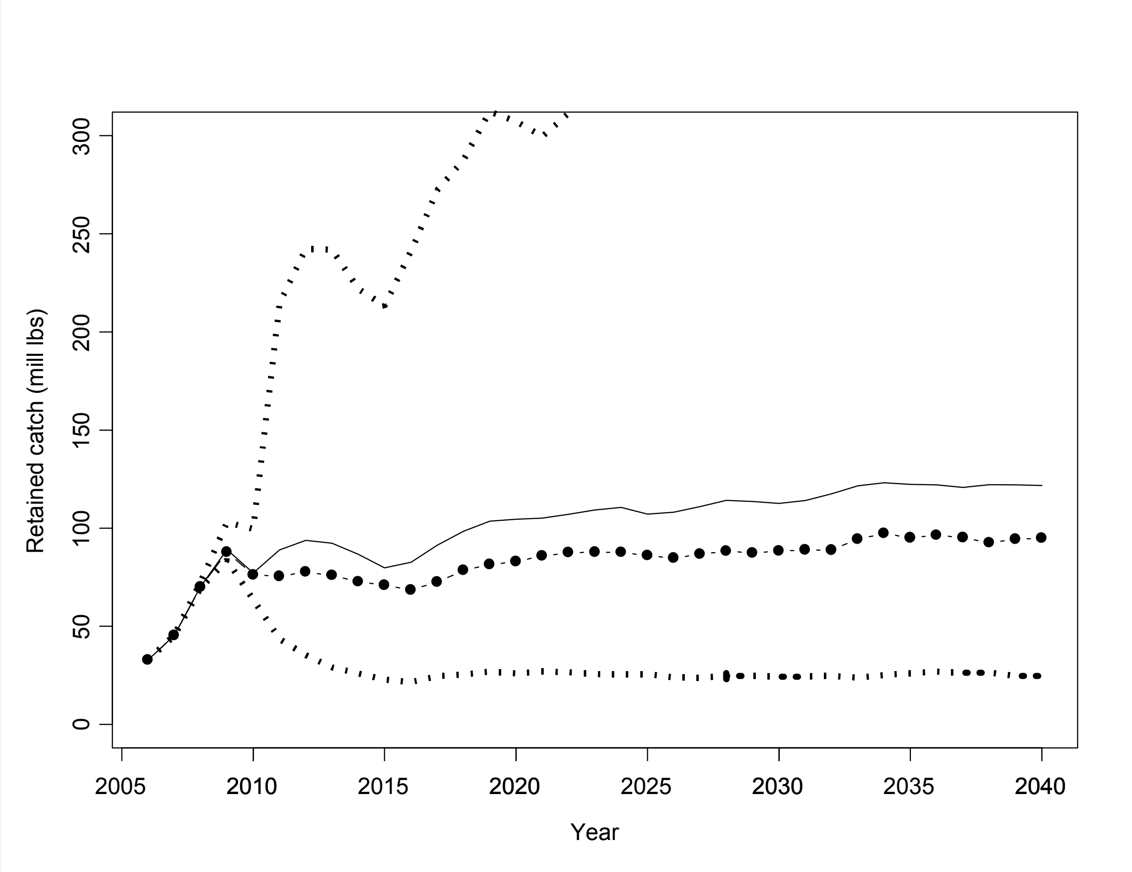

Figure 55. Projection of retained catch fishing at the current harvest control rule. Solid line is the mean retained catch, line with dots is the median retained catch, and dotted lines are the 95% probability intervals.

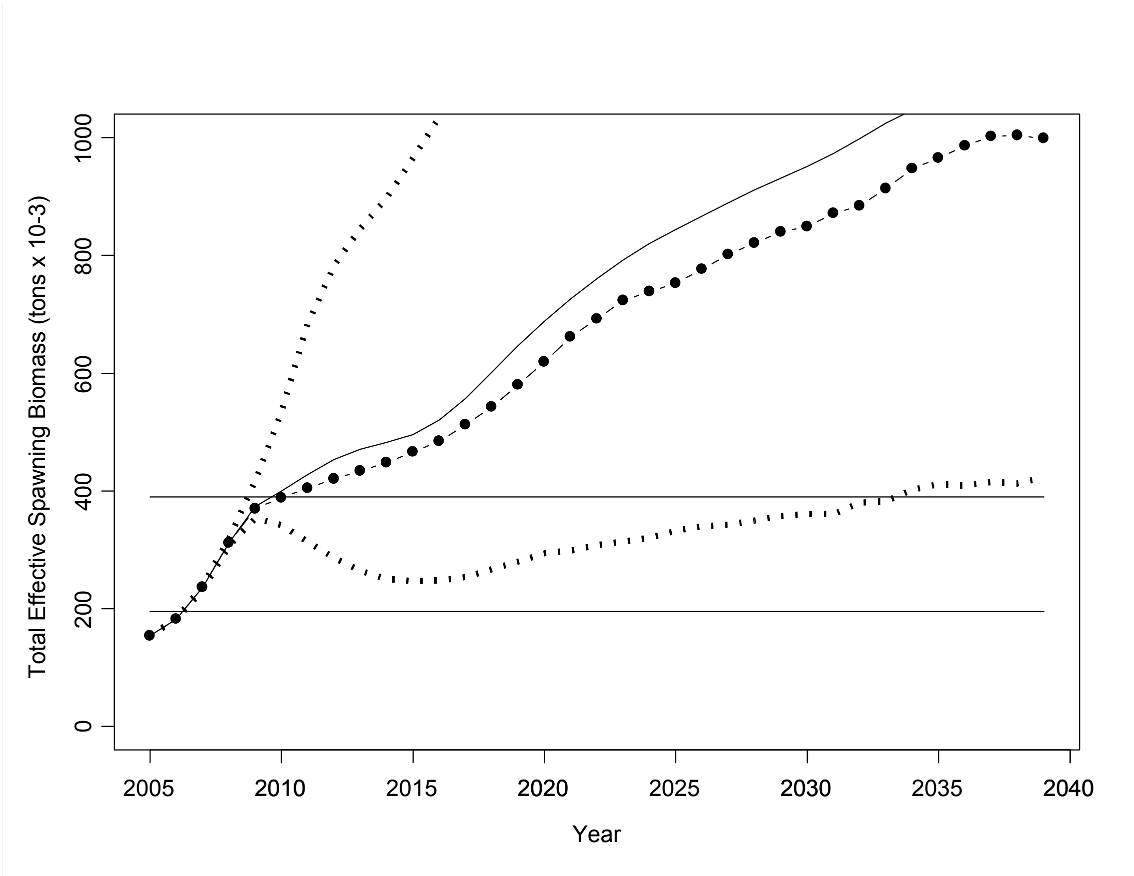

Figure 56. Projection of total effective spawning biomass (TESB), with F=0. Year is the survey year. Solid line is the mean TESB, line with dots is the median TESB, and dotted lines are the 95% probability intervals. The upper horizontal line is Bmsy and the lower½ Bmsy. The upper horizontal line is Bmsy and the lower ½ Bmsy.

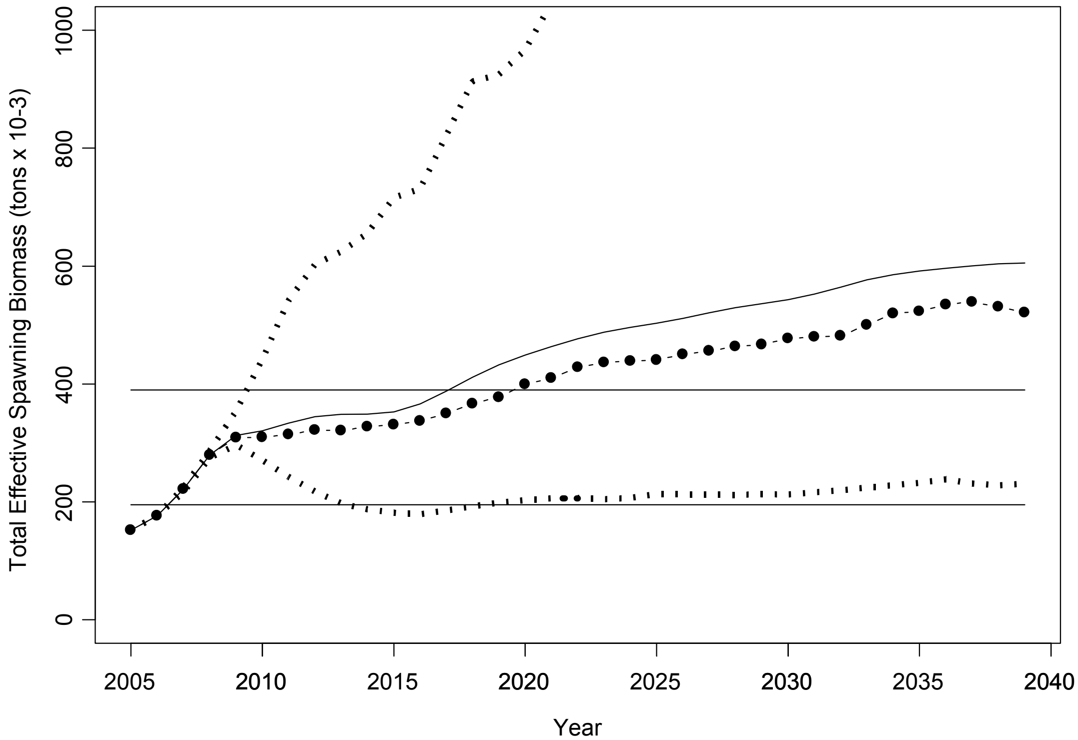

Figure 57. Projection of total effective spawning biomass (TESB), with control rule where maximum F target = 0.4 Fmsy. Year is the survey year. Solid line is the mean TESB, line with dots is the median TESB, and dotted lines are the 95% probability intervals. The upper horizontal line is Bmsy and the lower ½ Bmsy. The upper horizontal line is Bmsy and the lower ½ Bmsy.

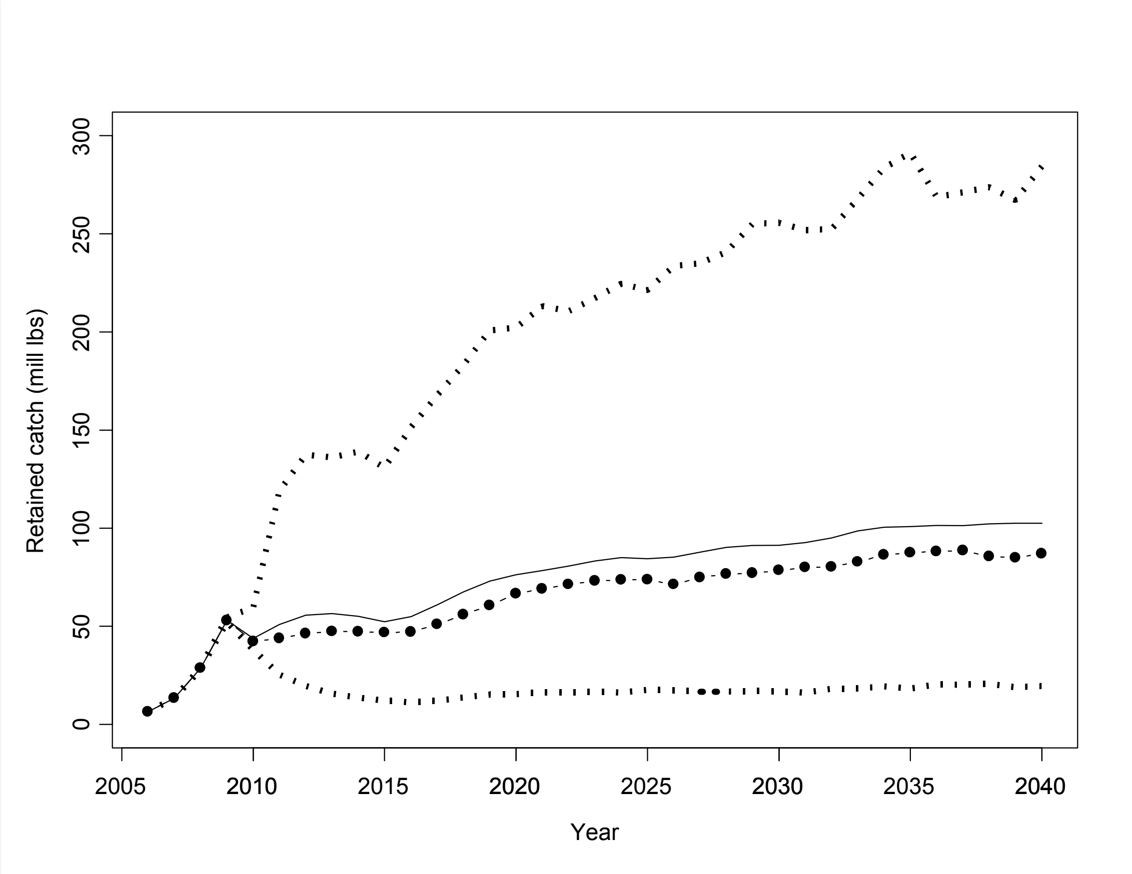

Figure 58. Projection of retained catch fishing at the Fmax = 0.4 Fmsy control rule, which would allow the stock to rebuild in 15 years. Solid line is the mean retained catch, line with dots is the median retained catch, and dotted lines are the 95% probability intervals.

Appendix A.

Table A.1. Model equations describing the population dynamics.

$N_{s,t,1} = R_{s,t} = R_{0,s} e^{\tau_{s,t}}$	$\tau_{s,t} \sim N(0,\sigma_R^2$	Recruitment
TOTAL POT CATCH $C_{t,totalpotfishery,s,sh,l} = \sum_{mature,immature} \frac{F_{s,totalpotfishery,mat,sh,t,l}}{F_{s,mat,sh,t,l}}(1-e^{-F_{s,mat,sh,t,l}})e^{-M_{s,mat,sh} Cmid_t} N_{s,mat,sh,t,l}$ RETAINED POT CATCH $C_{t,retainedfishery,s,sh,l} = \sum_{mature,immature} \frac{F_{s,retainedfishery,mat,sh,t}}{F_{s,mat,sh,t,l}}(1-e^{-F_{s,mat,sh,t,l}})e^{-M_{s,mat,sh} Cmid_t} N_{s,mat,sh,t,l}$ TRAWL BYCATCH $C_{t,trawlfishery,s,sh,l} = \sum_{mature,immature} \frac{F_{s,ftrawlfishery,mat,sh,t,l}}{F_{s,mat,sh,t,l}}(1-e^{-F_{s,mat,sh,t,l}})e^{-M_{s,mat,sh} Cmid_t} N_{s,mat,sh,t,l}$	$1 \le t \le$ $1 \le l \le$	Catch taken as a pulse fishery at midpoint of catch(survey is considered start of the year).
$Nimmature_{new,t+1,s,l+1} =$ $(Nimmature_{new,t,s,l} e^{-Zimmat_{new,t,s,l}})Gr_{s,l}(1-\phi_{s,l})$ $Nmature_{new,t+1,s,l+1} =$ $(Nimmature_{new,t,s,l} e^{-Zimmat_{new,t,s,l}})Gr_{s,l}(\phi_{s,l})$ $Nmature_{old,t+1,s,l+1} =$ $(Nmature_{new,t,s,l} e^{-Zmat_{new,t,s,l}}) + (Nmature_{old,t,s,l} e^{-Zmat_{old,t,s,l}})$	$1 \le t <$ $1 \le l \le$	Numbers at size
$SB_{t,s} = \sum_{l=1}^{L} w_{s,l}(Nmature_{new,t,s,l} + Nmature_{old,t,s,l})$		spawning biomass by sex

Table A.1. continued.

$Z_{t,s,sh,l} = \sum_{fishery} F_{t,fishery,s,sh,l} + M$			Total Mortality
$C_{t,fishery} = \sum_{s}\sum_{sh}\sum_{l} C_{t,fishery,s,sh,l}$			Total Catch in numbers
$p_{t,sh,l} = C_{t,sh,l} / C_t$			proportion at size in the catch
$Y_t = \sum_{l=1}^{L} w_{t,l} C_{t,l}$			Catch biomass
$F_{t,fishery,s,sh,l} = s_{t,s,sh,l} F_{t,fishery}$			Fishing mortality
$F_{t,s,sh,l} = \sum_{fishery} F_{t,fishery,s,sh.l}$			Total F over all fisheries (total pot and trawl fisheries)
$S_{t,s,sh,l} = \frac{1}{1+e^{-a_{s,sh}(l-b_{t,s,sh})}}$			Fishery selectivity for total catch sex or shell condition s and size bin l. The 50% parameter changes over time.
$S_{male,t,sh,l} = \frac{1}{1+e^{-a_{male,sh}(l-b_{t,male,sh})}} \frac{1}{1+e^{-c_{sh}(l-d_{sh})}}$			Fishery selectivity for male retained catch by shell condition sh and size bin l is the selectivity for total catch multiplied by the retention curve

Table A.1. continued. $S_{surv,l} = q\dfrac{1}{1+e^{-a_{surv}(l-b_{surv})}}$ $S_{trawl,s,l} = \dfrac{1}{1+e^{-a_{s,trawl}(l-b_{s,trawl})}}$ $MP_l = 1 - \dfrac{1}{1+e^{-a(l-b)}}$			Survey selectivity by size – same for males and females Trawl bycatch selectivity by size and sex Declining logistic for Molting probability by size
$SB_{s,t} = \sum_{s} \sum_{l=1}^{L} w_{s,l} s_{surv,l} N_{s,t,l}$ $Gr_{s,l\to l'} = \int_{l'-2.5}^{l'+2.5} Gamma(\alpha_{s,l}, \beta_s)$ $width_{t+1} = a_s + b_s width_t$			Total Survey biomass Growth transition matrix using a Gamma distribution Mean post-molt width given pre-molt width

Table A.2. Negative log likelihood components.

$\lambda\sum_{t=1}^{T}\left[\log(C_{t,fishery,obs})-\log(C_{t,fishery.pred})\right]^2$	Catch using a lognormal distribution.
$-\sum_{t=1}^{T}\sum_{l=1}^{L} nsamp_t * p_{obs,t,l}\log(p_{pred,t,l})$ - offset	size compositions using a multinomial distribution. Nsamp is the observed sample size. Offset is a constant term based on the multinomial distribution.
offset = $\sum_{t=1}^{T}\sum_{a=1}^{A} nsamp_t * p_{obs,t,a}\log(p_{obs,t,a})$	the offset constant is calculated from the observed proportions and the sample sizes.
$\sum_{t=1}^{ts}\left[\frac{\log\left[\frac{SB_{obs,t}}{SB_{pred,t}}\right]}{sqrt(2)*s.d.(\log(SB_{obs,t}))}\right]^2$	Survey biomass using a lognormal distribution, ts is the number of years of surveys.
$s.d.(\log(SB_{obs,t})) = sqrt(\log((cv(SB_{obs,t}))^2+1))$	
$\lambda\sum_{s=1}^{2}\sum_{t=1}^{T}(e^{\tau_{s,t}})^2$	Recruitment, where $\tau_{s,t}\sim N(0,\sigma_R^2)$
$\lambda\sum_{t}\left[\log(\frac{R_{male,t}}{R_{female,t}})\right]^2$	Sex ratio penalty
$\lambda\sum_{t=1}^{t=T-1}\left[\log(s_{50\%,sh,t+1})-\log(s_{50\%,sh,t})\right]^2$	Constraint on size at 50% for fishery selectivity

Table A.3. List of variables and their definitions used in the model.

Variable	Definition
T	number of years in the model(t=1 is 1978 and t=T is 2003
L	number of size classes (L =22)
W_l	mean body weight(kg) of crabs in size group l.
ϕ_l	proportion mature at size l.
R_t	Recruitment in year t
R_0	Geometric mean value of recruitment
τ_t	Recruitment deviation in year t
$N_{l,a}$	number of fish in size group l in year t
$C_{t,l}$	catch number of size group l in year t
$p_{t,l}$	proportion of the total catch in year t that is in size group l
C_t	Total catch in year t
Y_t	total yield in year t
$F_{t,s,sh,l}$	Instantaneous fishing mortality rate for size group l, sex s, shell condition sh, in year t
M	Instantananeous natural mortality rate
E_t	average fishing mortality in year t
ε_t	Deviations in fishing mortality rate in year t
$Z_{t,l}$	Instantantaneous total mortality for size group l in year t
GR	Growth transition matrix
$S_{s,l}$	selectivity for size group l, sex or shell condition s.

Table A.4. Estimated parameters for the model. There were 213 total parameters estimated in the model.

Parameter	Description
$\log(R_0)$	log of the geometric mean value of recruitment, one parameter
τ_t $1978 \le t \le 2002$, 25 parameters for each sex.	Recruitment deviation in year t
Initial numbers by length for each sex and shell condition, 88 parameters.	Initial numbers by length
$\log(f_0)$	log of the geometric mean value of fishing mortality
ε_t $1978 \le t \le 2002$, 25 parameters, one set for retained catch, one set for female discard, and one set for trawl bycatch equals 75 total.	deviations in fishing mortality rate in year t
Slope and 50% selected parameters of the logistic curve	selectivity parameters for the total catch (retained plus discard) of new and old shell males.
Slope and 50% selected parameters of the logistic curve(2 parameters new shell, 2 parameters old shell)	Retention curve parameters for the retained males.
Slope and 50% selected parameters of the logistic curve (6 parameters)	Selectivity parameters for survey male and female crabs for three survey periods (1978-81, 82-88,89 to present).
Slope and 50% selected parameters of the logistic curve(2 parameters male, 2 parameters female)	Selectivity parameters for trawl bycatch male and female
Slope and 50% selected parameters of the logistic curve(2 parameters)	Selectivity parameters for crab fishery female bycatch
Size at 50% selected for fishery new and old shell 1978 to 2002, 2*25 paramaters plus 2 means	Changing fishery selectivity over time

Table A.5. Fixed parameters in the Admodel builder model.

Parameter	Description
M	Natural mortality
Q = 1.0 for 1982 to present surveys	Survey catchability
Parameters for the linear growth function, intercept a and slope b (2 parameters male, 2 parameters female). Standard deviation of size at the first size bin and standard deviation of size for the last size bin.	Growth parameters estimated from Bering sea snow crab data (14 observations).
Slope and 50% parameters of the declining logistic curve	molting probabilities for immature male crabs

APPENDIX B

PRELIMINARY RESULTS OF BERING SEA CRAB ASSESSMENTS CONDUCTED DURING JUNE 2005 BY THE BERING SEA FISHERIES RESEARCH FOUNDATION -- A PILOT STUDY

Steven E. Hughes and Scott E. Goodman
Natural Resources Consultants, Inc. Seattle, Washington

September 14, 2005

INTRODUCTION

In cooperation with the NMFS Alaska Fisheries Science Center (NMFS/AFSC) and Alaska Department of Fish and Game (ADFG), the Bering Sea Fisheries Research Foundation (BSFRF) organized and completed its first season of field research during June 2005. As presented during the Crab Plan Team meetings of September 6-9, 2005, this pilot study focused on the testing of specialized trawl gear and crab survey methods in the Bering Sea that have been utilized for several years to assess *opilio* Tanner crab in the Gulf of St. Laurence, Canada.

This document provides a brief narrative and 15 exhibits summarizing the objectives, methods and preliminary results of the pilot study's cooperative research. Area swept crab abundance estimates generated from this survey and from the standard NMFS trawl survey within the same 4,000 square nautical mile study area are presented and compared. Final results and detailed description of methods and the survey design will be completed in the near future.

RESEARCH OBJECTIVES

BSFRF research objectives for the 2005 survey work were:

1. To determine the feasibility of conducting a survey using a gear/equipment package presently designed and used in Eastern Canada, to survey Bristol Bay red king crab, *bairdi* Tanner crab and *opilio* snow crab in a selected area of the SE Bering Sea,

2. To estimate mean and variance of the abundances of juvenile and mature male and female Bristol Bay red king crab, Tanner crab and snow crab in the study area,

3. To compare estimates of crab density by species/size/sex categories from the pilot survey with estimates from NMFS standard survey in the same areas of high density, and

4. To evaluate the scientific utility, feasibility and cost of the alternative survey design for long term application.

SURVEY GEAR AND METHODS

The BSFRF chartered the 120 foot stern ramp trawler *F/V American Eagle* and her crew of four for the survey work. The scientific party of five was lead by chief scientist Dr. Gerard Conan who is working under contract for the BSFRF. Dr. Conan has been a key person in the design and conduct of the Gulf of St. Lawrence *opilio* snow crab research program for several years. The remainder of the scientific party consisted of Jean-Gilles Chiasson, a skipper/gear expert from Canada, Scott Goodman, a biologist with Natural Resources Consultants, Rachel Alinsunurin, a biologist with ADF&G and Casey Campbell, a technician hired by BSFRF for the survey work.

The gear package was leased by the BSFRF from a Canadian firm and it matched the gear package recently used by Dr. Conan in the Gulf of St. Lawrence *opilio* survey. The package consisted of otter trawls and trawl doors (three identical sets in case of gear damage/loss) specially designed and rigged for "heavy on bottom tending characteristics," NETMIND™ acoustical sensors for trawl spread and performance measurements and associated instrumentation and software for performance monitoring and data recording. The research trawls measured 20 meters on the head rope by 27 meters on the footrope. The trawls were equipped with a "tickler chain array" designed to "dig out" crab in the substrate for subsequent capture (Exhibits 1-4).

Operations were conducted during a 20-day period in June of 2005 and timed to match the standard NMFS survey of Bristol Bay red king crab in the southeastern Bering Sea. The pilot survey for red king crab was conducted in 10 NMFS standard survey blocks that in the two prior years had represented a core area of higher density legal sized male red king crab (Exhibit 5). Within this 4,000 square mile area, 129 tow sites were randomly chosen from a predetermined sampling grid (Exhibit 6). Tow durations were set at 5-7 minutes and gear performance was monitored and recorded during each tow for area swept (spread and distance towed with full bottom contact). In the Bristol Bay red king crab survey, all captured crab were sorted, sexed and measured without subsampling. All haul, catch and biological data were entered into an electronic database with backup onboard the *F/V American Eagle*. All data was subsequently error checked and edited.

The Bristol Bay red king crab survey as planned was completed five days ahead of schedule which provided for some limited work on the *opilio* grounds. For that work, three standard NMFS survey blocks north of St. Paul Island (Exhibit 5) were chosen for a mini survey which consisted of 26 pre selected tow sites (Exhibit 7). The selection of three blocks for the *opilio* mini survey was also based on likely high density areas according to NMFS data from the previous two years.

Analysis of BSFRF survey data from the 10 blocks surveyed in the Bristol Bay red king crab district was completed using the standard NMFS area swept methodology of generating crab densities in numbers of animals per square nautical mile and expanding these numbers to crab abundance estimates for the area in the 10 blocks (about 4,000 square nautical miles). Analysis of red king crab abundance was summarized by the NMFS five standard size/sex categories; large males (≥135 mm), medium males (110-134 mm), small males (<110 mm), small females (<90 mm) and large females (≥90 mm). For the same 10 blocks, we also received from NMFS their 2005 survey haul and crab catch data. We analyzed this data following the same area swept procedures to generate a comparison with the crab abundance determined from the BSFRF survey.

RESULTS, BRISTOL BAY RED KING CRAB

The Canadian gear package performed extremely well on the Bering Sea red king crab grounds. Equipped with a variable pitch propeller, the *F/V American Eagle* was able to tow the small trawl at desired slow speeds of 1.8-2.2 knots. The NETMIND™ acoustical sensors also performed well and indicated good trawl contact with the seabed as did physical indicators of the trawl. For the short tow durations, the trawl did not "over load" with bottom debris and the coarse sand/gravel substrate filtered out of the trawl effectively.

The *F/V American Eagle* and crew were able to complete 9-15 tows per day with an average of 11 tows completed per day during this survey. NMFS tows in the Bristol Bay red king crab district, which consists of 136 survey blocks, caught red king crab in only 61 blocks during 2004 and in 65 blocks during their 2005 survey (Exhibits 8-9). Given a focus on survey blocks in the red king crab district with crab catches and avoidance of blocks without red king crab catches, a BSFRF style of survey could be conducted in about two months of vessel time at the 2005 sampling density of about 13 tows per 400 square miles. Optimal sampling densities are being further investigated and will be updated.

Exhibit 10 provides densities and abundance estimates of red king crab from the 10 survey blocks as a result of the BSFRF survey and as a result of the standard NMFS survey of the same 10 blocks. The BSFRF survey produced substantially higher densities of all sizes of both male and female red king crab than did the standard NMFS survey (Exhibit 11). If one assumes that the catchability coefficient of the BSFRF trawl gear was 1.0, the NMFS trawl catchability coefficient equaled 0.60 for large male red king crab, 0.38 for medium males, 0.34 for small males, 0.48 for large females and 0.49 for small females (Exhibit 12). It should be noted that BSFRF survey area swept per tow used for preliminary results is based on conservative estimates of tow duration, tow speed and trawl spread of 7 minutes, 2.2 knots and 8 meters, respectively. Final analysis may prove different actual tow specifications yielding a smaller area swept which would increase BSFRF abundance estimates further.

RESULTS, *OPILIO* TANNER CRAB

On the much softer and more muddy substrate of the *opilio* grounds, the Canadian gear package performed well but tended to "mud up" from 5-7 minute tow durations. On haul-back, codends on the *opilio* grounds contained substantial mud but most could be cleared from the trawl by prop wash if the codend was towed near the stern of the vessel for several minutes before being hauled up the stern ramp (Exhibit 13). Gear performance is still being reviewed but preliminary indications are that tow durations much longer than 5-7 minutes with this trawl would likely compromise gear configuration and operational performance. Whole haul catch sampling proved impossible due to the high catch volumes of *opilio* (Exhibit 14), and as a result for this limited survey, only total *opilio* catch weights were obtained. The crew was not prepared to subsample *opilio* catches by collecting random subsamples of *opilio* for sexing and measurements. *Opilio* catches from the 26 tows completed in the three blocks surveyed were typically 5-7 baskets of crab per 5-7 minute tow but peaked at 19 baskets weighing 303 kilograms.

Opilio densities determined from the BSFRF 26 tow mini survey of the three blocks representing about 1,200 square nautical miles translated to a biomass of total *opilio* (all sizes, male and female) of approximately 183 million pounds. The biomass estimate from the NMFS survey of the same 3 survey blocks was approximately 27 million pounds (Exhibit 15).

CONCLUSIONS AND CONTINUING WORK

The Canadian otter gear package performed very well on the seabed in the Bristol Bay red king crab district. Survey effort and collection of biological data from whole haul sampling proved feasible and progressed at an average rate of 11 tows per day. Using this gear package and survey methodology, future surveys of Bristol Bay red king crab over grounds where red king crab has occurred in recent years would likely require about two months of vessel time. Area swept by the NMFS trawl survey in a 30 minute tow was about 11 times the area swept by the Canadian trawl in a 5-7 minute tow. For the 10 blocks surveyed by both gear types involving 129 BSFRF tows and 10 NMFS tows, the resulting crab densities and abundance estimates differed substantially for nearly equal areas of the seabed swept by a trawl. We conclude that the NMFS trawl is sampling about 60% of the legal sized red king crab and much less of smaller sized king crab. The limited *opilio* work completed during the BSFRF 2005 survey was a bonus. While the gear performance was reasonably good at 5-7 minute tows, gear "mud-up" may be a problem on some *opilio* grounds. *Opilio* catch rates were high in the limited area sampled and it was not possible to sex and measure all crab in catches without subsampling—a task which needs to be further investigated for future *opilio* work. Results of the limited BSFRF *opilio* survey and comparisons with the NMFS standard trawl survey over a 1,200 square nautical mile area indicate that the NMFS trawl survey grossly underestimates *opilio* abundance.

During the next two months, Dr. Conan will analyze the results of the BSFRF survey of Bristol Bay red king crab using his analytical tools and complete variance and biomass estimates for a more detailed comparison to the NMFS trawl survey in the 10 blocks surveyed during 2005. Similar work will also be completed with the limited *opilio* survey data. We will also determine an optimal sampling density based on the BSFRF methods that can be deployed in the future to maximize survey coverage per unit of survey cost with minimal loss of precision of crab abundance estimates.

The BSFRF is pleased to present preliminary results of their work during 2005 to the North Pacific Fishery Management Council's Crab Plan Team and we look forward to continuation of this research in the future. We thank the Alaska Fisheries Science Center and Alaska Department of Fish and Game for their assistance in this cooperative research.

ACKNOWLEDGEMENTS

This pilot study was a cooperative research project completed successfully due to coordinated efforts of several individuals from the BSFRF, NMFS and ADFG and others. Significant thanks are extended to John Wood, skipper of the *F/V American Eagle* and his crew for their efficiency and hard work in successfully completing more survey area than planned.

Exhibit 1. Canadian otter trawl on deck of *F/V American Eagle*.

Exhibit 2. Canadian otter trawl showing footrope and tickler chain configuration.

Exhibit 3. Canadian otter trawl showing details of wrapped footrope and tickler chain.

Exhibit 4. Codend of the Canadian otter trawl placed in the *F/V American Eagle's* sorting table (top photo), and sorted red king crab (bottom photo).

Exhibit 5. Location of 10 survey blocks where the BSFRF survey was conducted for red king crab and the location of the 3 survey blocks where the BSFRF survey was conducted for *opilio* Tanner crab.

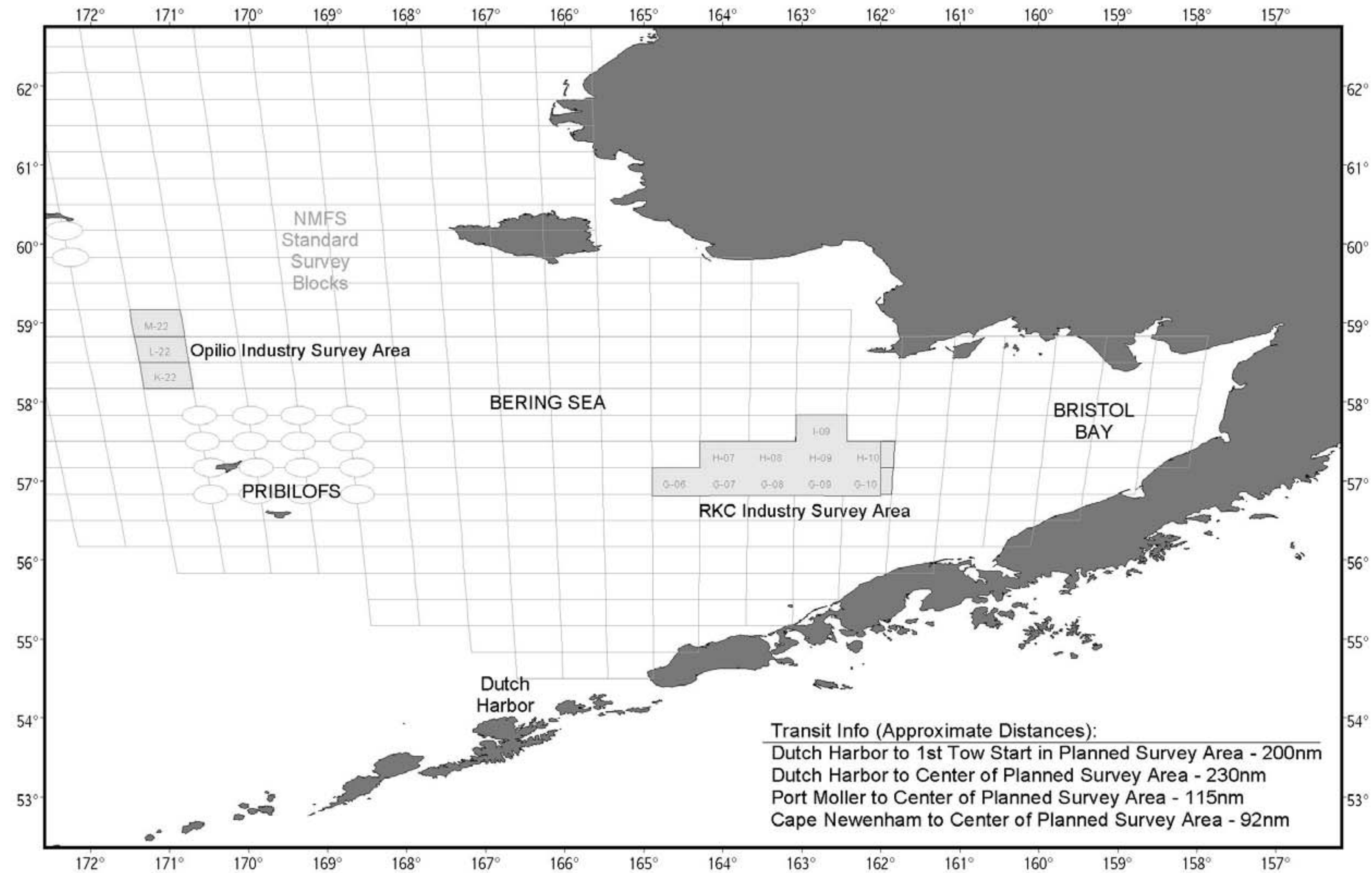

Exhibit 6. BSFRF survey design of 10 NMFS survey blocks in the Bristol Bay red king crab district where 129 tows were completed during June 2005.

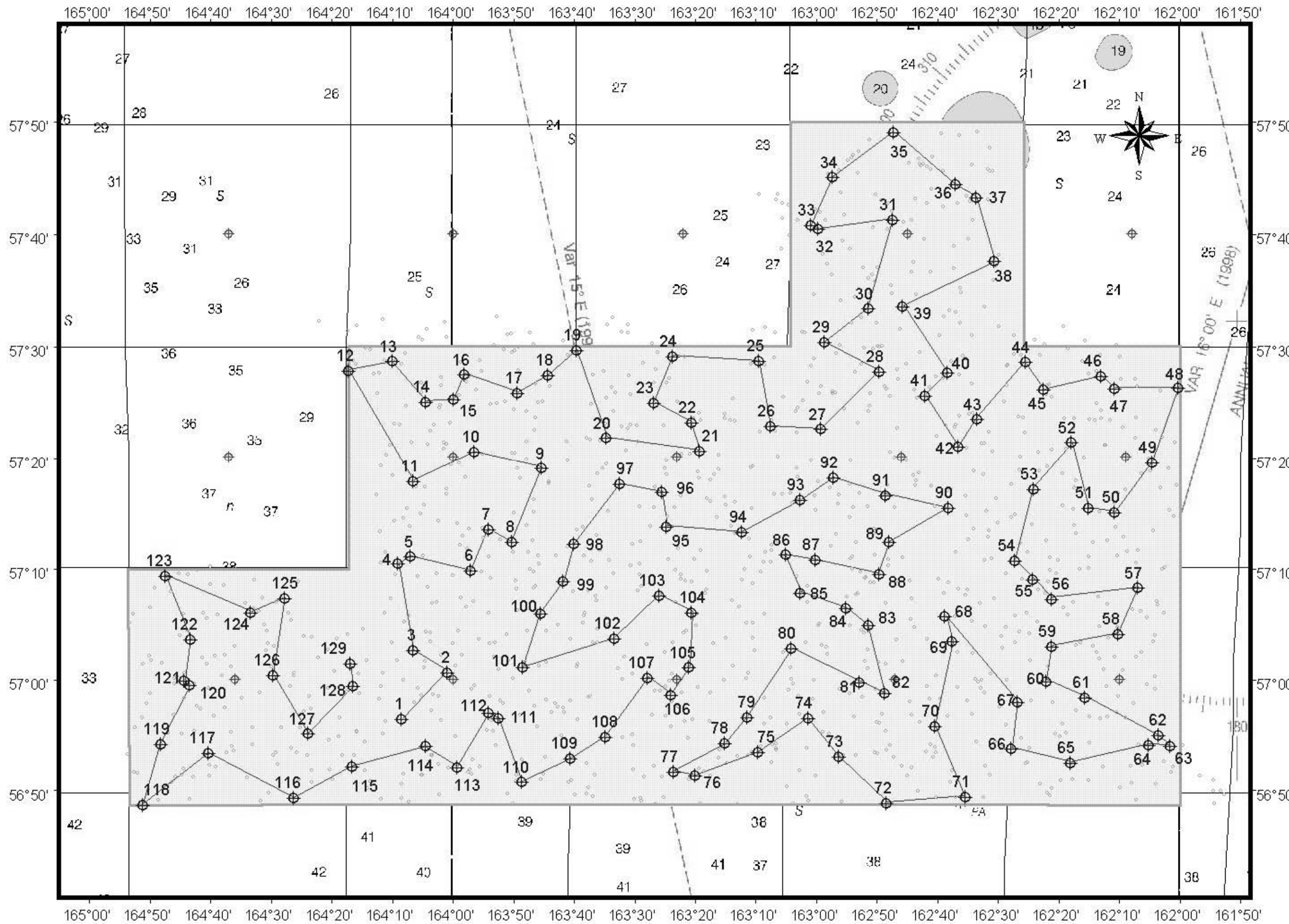

Exhibit 7. BSFRF survey design of three NMFS survey blocks in the opilio crab district where 26 tows were completed during June 2005.

OPILIO AREA SAMPLING PLAN

Order	Lat °	Lat '	Lon °	Lon '
1	58	42.572704	170	56.977588
2	58	44.170767	170	59.487143
3	58	44.948743	171	1.343383
4	58	50.824661	170	47.806396
5	58	57.245025	170	51.951222
6	58	59.317076	171	0.821305
7	59	2.908117	171	5.044907
8	59	7.921085	170	49.872046
9	59	9.166405	171	3.722944
10	59	6.046977	171	17.431807
11	58	59.292295	171	17.333406
12	58	53.298617	171	18.433512
13	58	51.375585	171	5.264243
14	58	42.822296	171	11.420541
15	58	40.420844	171	17.597054
16	58	36.273375	171	17.047239
17	58	31.141681	171	11.650538
18	58	23.769384	171	5.208367
19	58	20.559536	171	11.972352
20	58	13.921340	171	13.082368
21	58	14.311135	170	54.687394
22	58	19.377606	170	49.686033
23	58	22.244242	170	46.706097
24	58	27.868667	170	54.012203
25	58	31.375486	170	47.202880
26	58	33.981838	170	48.416745

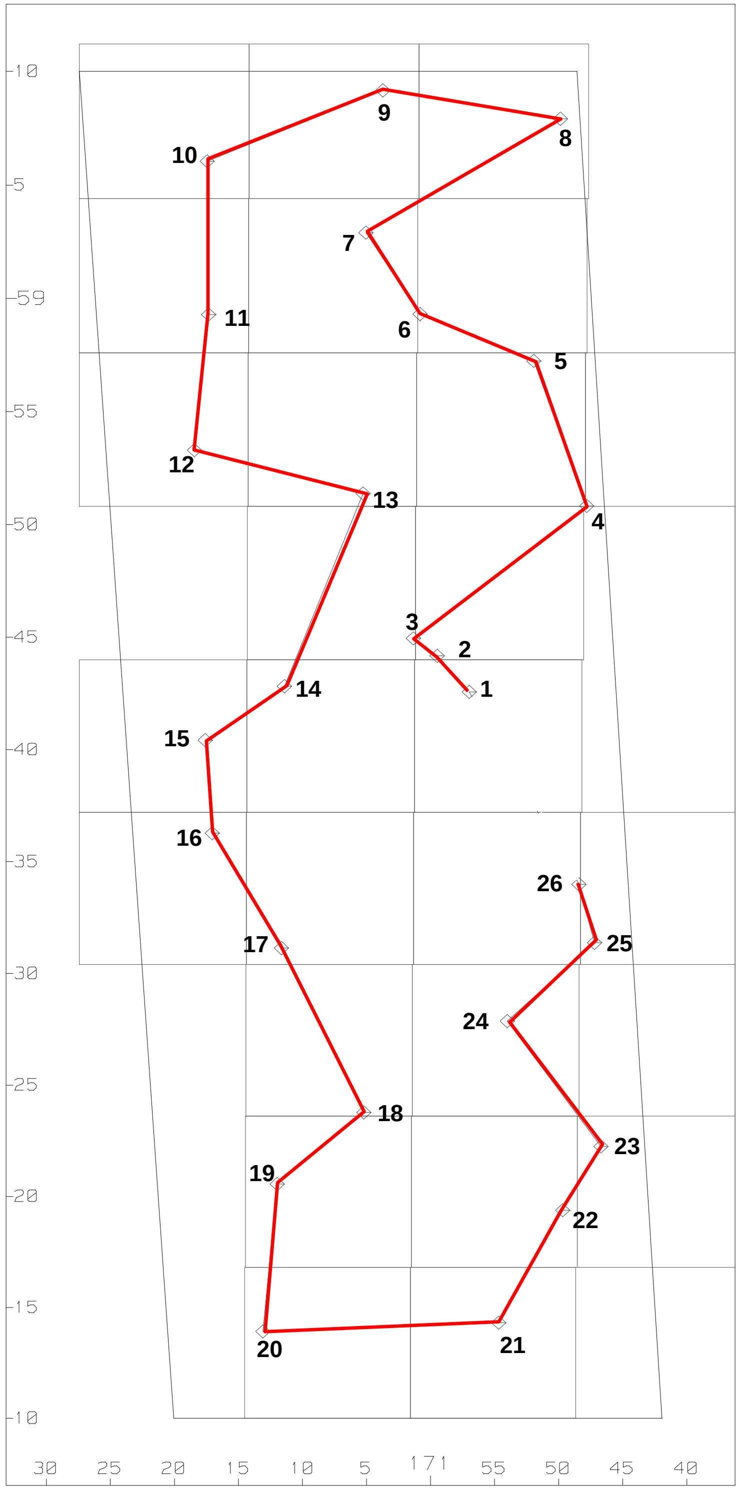

Exhibit 8. NMFS survey blocks in the Bristol Bay red king crab district with and without catches of red king crab during the 2004 NMFS survey.

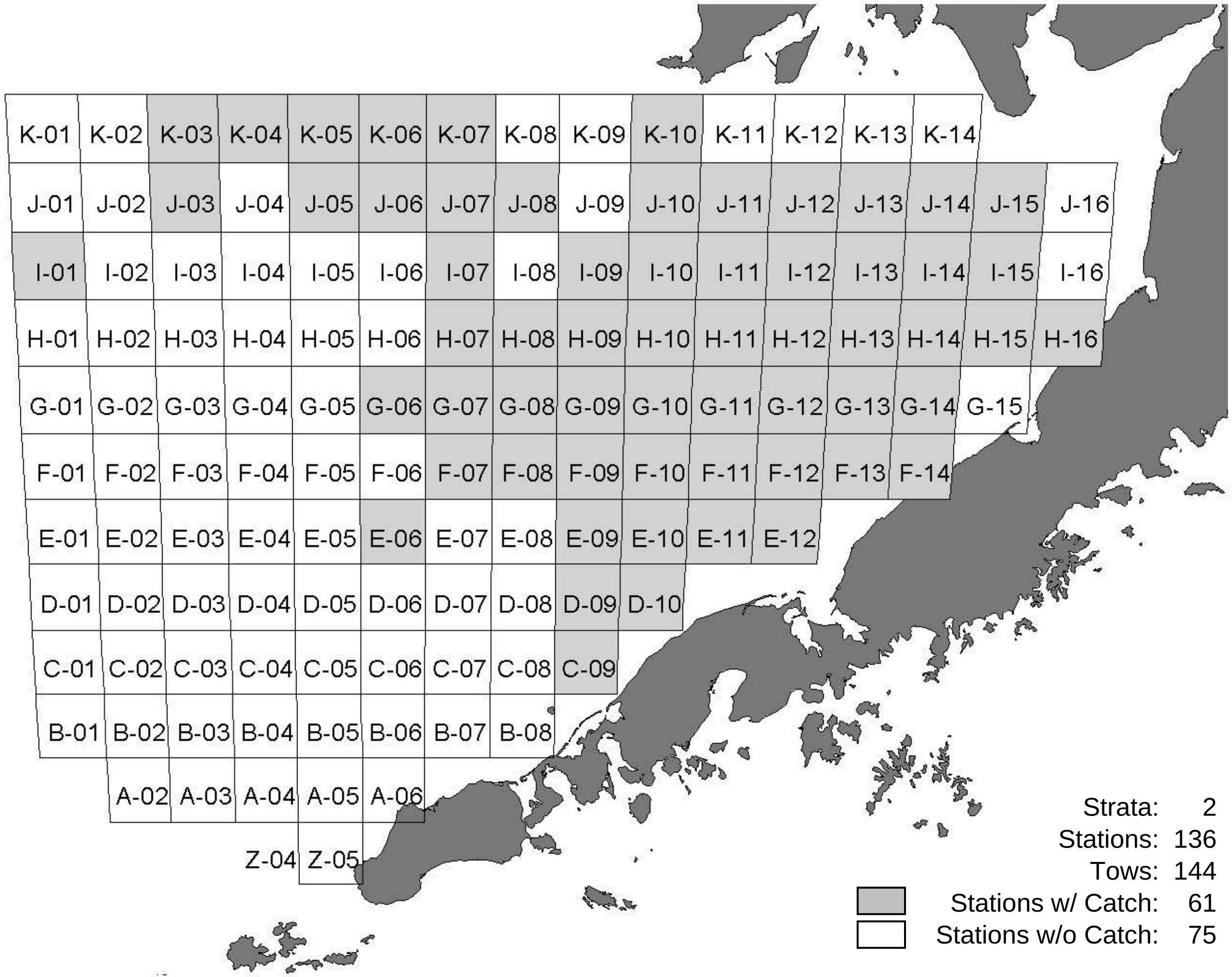

Exhibit 9. NMFS survey blocks in the Bristol Bay red king crab district with and without catches of red king crab during the 2005 NMFS survey.

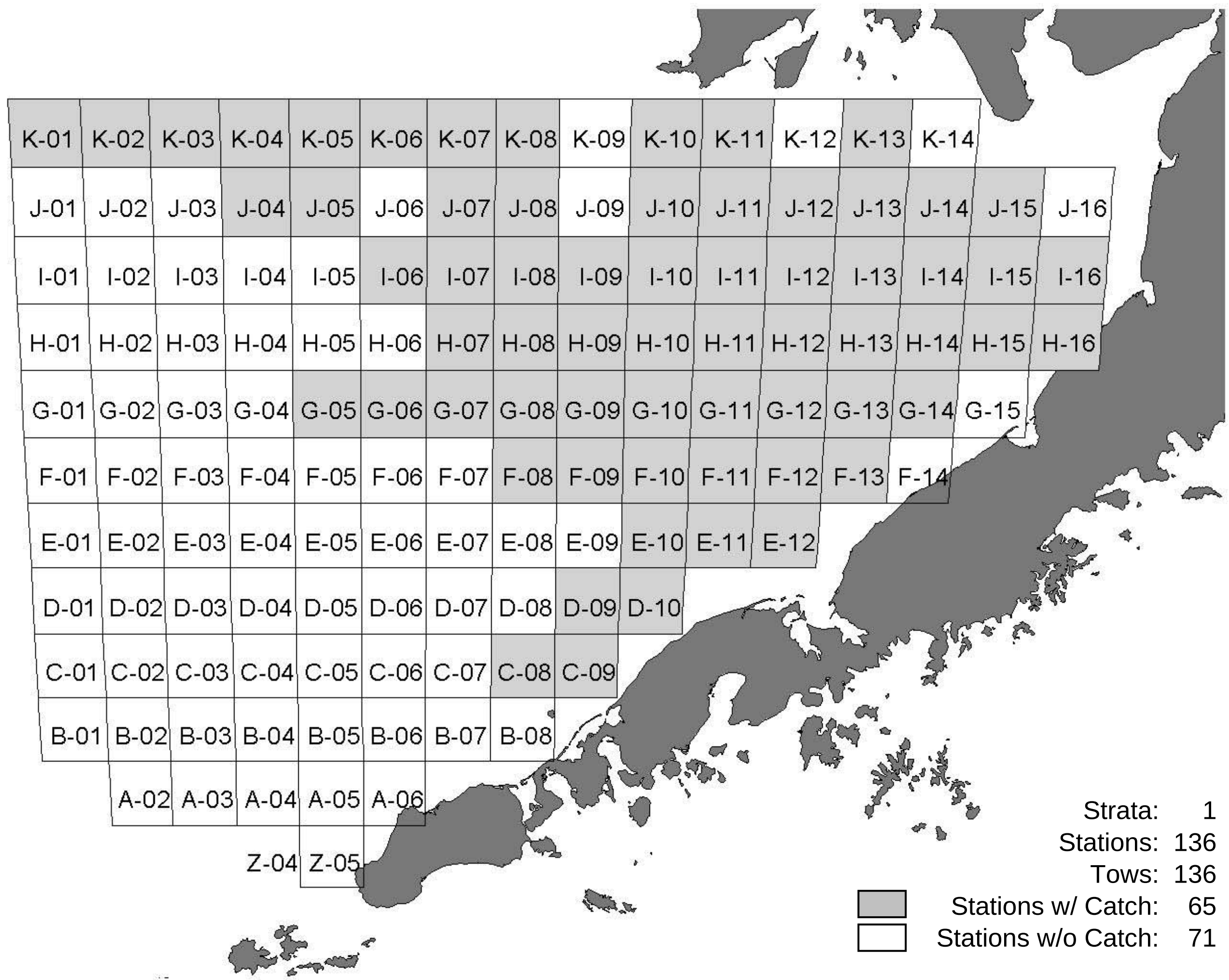

Exhibit 10. Bristol Bay red king crab densities and abundance estimates from 10 survey blocks determined by the BSFRF survey and the standard NMFS survey, June 2005.

2005 BSFRF 10 Block Survey Summary for RKC - #Tows, Crab/nm^2 by NMFS Station (* 7 min, 2.2 kts, 8 m)

		RKC Males				RKC Females			
Station	Tows	Large	Medium	Small	All	Large	Small	All	All RKC
G-06	12	526	0	0	526	0	0	0	526
G-07	20	1,578	1,353	225	3,157	90	0	90	3,247
G-08	12	1,578	2,255	977	4,810	3,307	75	3,382	8,193
G-09	14	1,546	2,448	2,319	6,314	10,566	193	10,759	17,073
G-10	13	1,041	1,249	2,220	4,510	16,513	555	17,068	21,577
H-07	15	2,586	5,291	1,263	9,140	601	0	601	9,741
H-08	13	2,983	7,007	2,636	12,627	4,579	69	4,649	17,276
H-09	13	1,665	3,538	1,526	6,730	6,175	139	6,314	13,044
H-10	11	2,952	1,886	1,148	5,986	4,674	738	5,412	11,397
I-09	11	1,230	1,722	328	3,280	1,312	0	1,312	4,592
Ttl/Avg	134*	1,770	2,692	1,245	5,708	4,617	162	4,779	10,487
10 Station Abundance Est. (Millions of Crab)		7.099	10.796	4.993	22.888	18.516	0.648	19.164	42.052

2005 NMFS Survey (Same 10 Blocks) Summary for RKC - #Tows, Crab/nm2 by NMFS Station

		RKC Males				RKC Females			
Station	Tows	Large	Medium	Small	All	Large	Small	All	All RKC
G-06	1	3,948	247	0	4,195	0	0	0	4,195
G-07	1	1,152	247	165	1,563	0	0	0	1,563
G-08	1	799	719	0	1,519	240	0	240	1,758
G-09	1	393	944	708	2,046	5,115	0	5,115	7,161
G-10	1	382	764	764	1,910	7,028	76	7,105	9,015
H-07	1	1,507	3,332	1,190	6,029	159	159	317	6,346
H-08	1	650	893	325	1,868	1,056	0	1,056	2,924
H-09	1	635	1,508	317	2,460	2,857	79	2,936	5,396
H-10	1	792	1,030	634	2,457	5,547	475	6,023	8,479
I-09	1	313	625	156	1,094	313	0	313	1,407
Ttl/Avg	10	1,057	1,031	426	2,514	2,231	79	2,310	4,825
10 Station Abundance Est. (Millions of Crab)		4.239	4.134	1.708	10.081	8.948	0.317	9.265	19.346

* 129 tows plus 3 test tows and 2 repeat tows

Exhibit 11. Percentage greater abundance estimates, BSFRF vs. NMFS survey of Bristol Bay red king crab by size-sex categories in the 10 block survey area, June 2005.

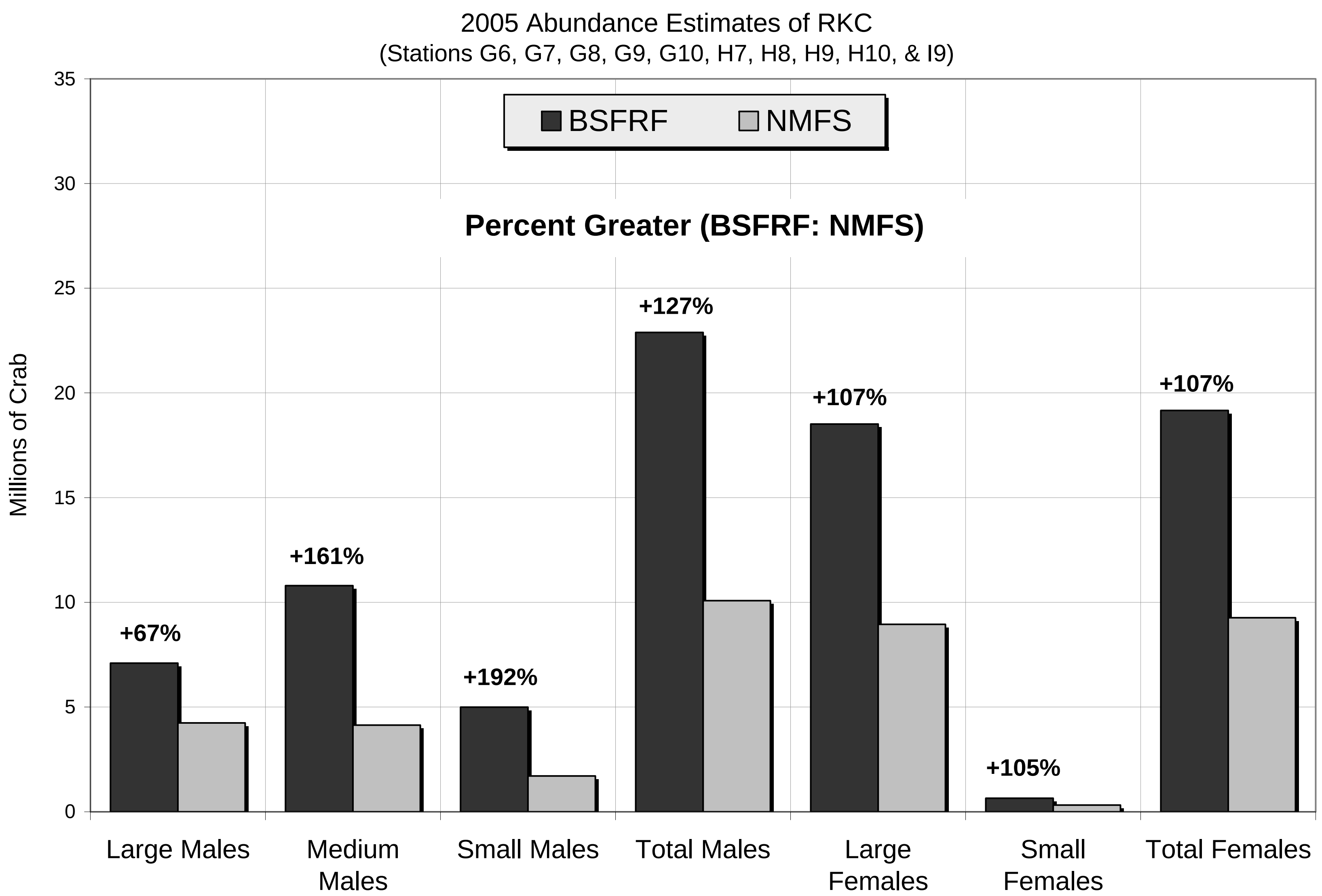

Exhibit 12. Calculated NMFS trawl catchability coefficients for Bristol Bay red king crab assuming the BSFRF survey catchability coefficient was 1.0.

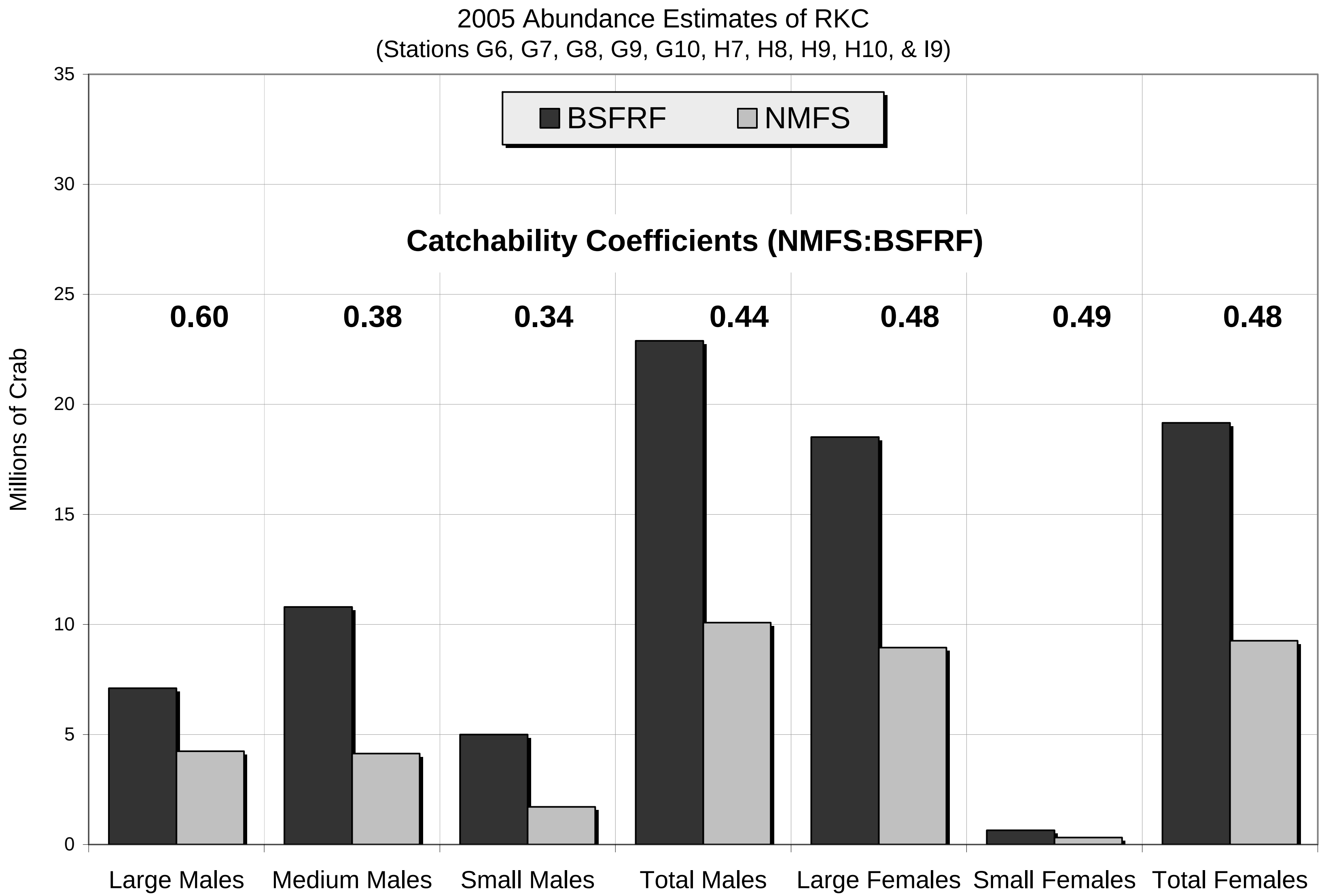

Exhibit 13. Canadian trawl codend with *opilio* catch being cleared of mud before hauling up the stern ramp.

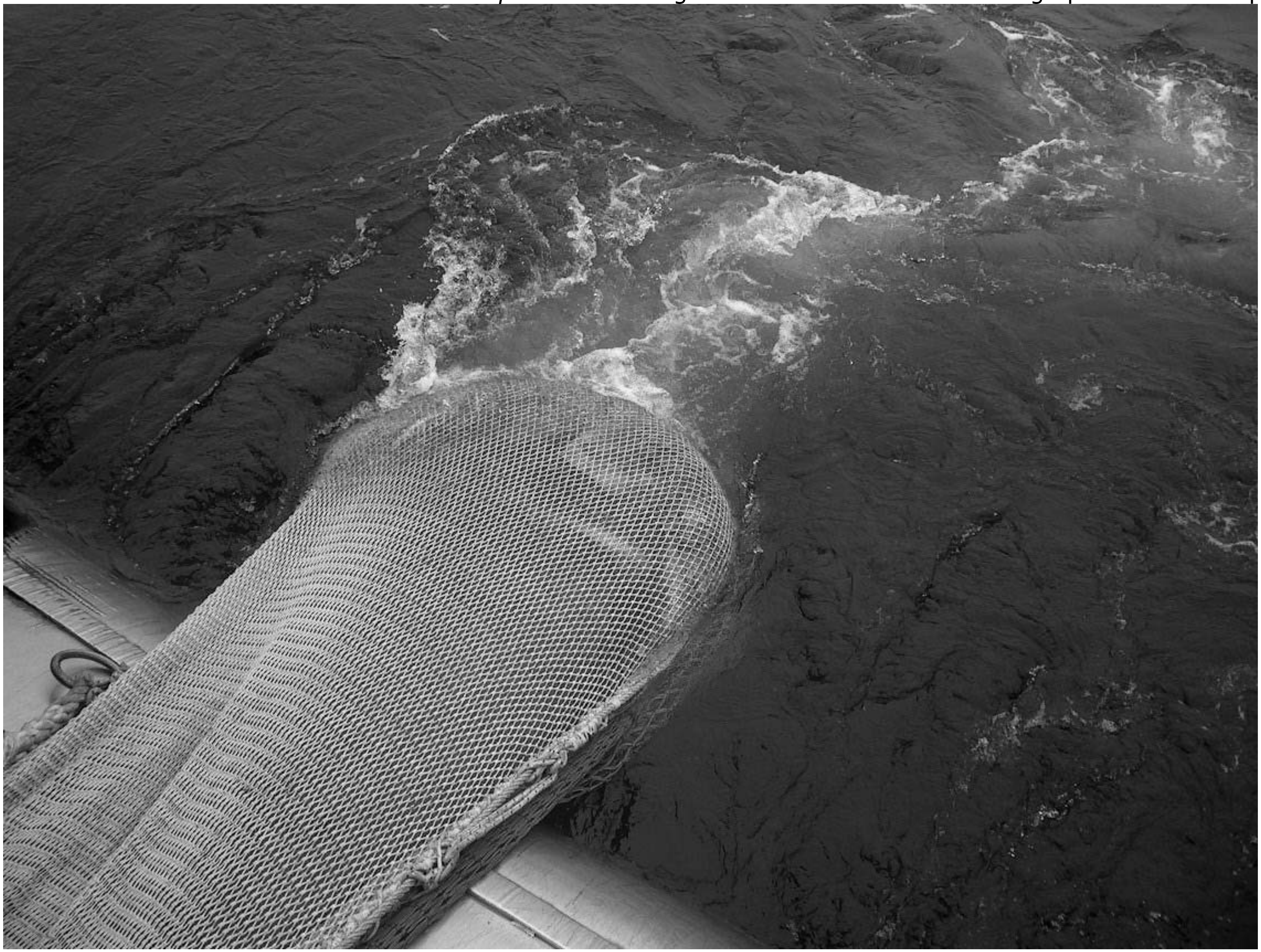

Exhibit 14. O*pilio* Tanner crab catch from BSFRF survey June 2005.

Exhibit 15. *Opilio* biomass estimates from the NMFS standard survey and the BSFRF survey of three survey blocks representing 1,200 square nautical miles in the Bering Sea north of St. Paul Island, June 2005.

OPILIO BIOMASS COMPARISON

NMFS DATA

Sex	Size	MdPt	1crabWtKg	Abund	Ttl LbsMil
M	10-14	12.5	0.00	0.000	0.000
M	15-19	17.5	0.00	0.000	0.000
M	20-24	22.5	0.00	0.122	0.001
M	25-29	27.5	0.01	0.000	0.000
M	30-34	32.5	0.01	0.122	0.002
M	35-39	37.5	0.01	0.000	0.000
M	40-44	42.5	0.02	0.000	0.000
M	45-49	47.5	0.03	0.453	0.030
M	50-54	52.5	0.04	0.977	0.088
M	55-59	57.5	0.05	1.002	0.119
M	60-64	62.5	0.07	0.488	0.075
M	65-69	67.5	0.09	1.490	0.291
M	70-74	72.5	0.11	4.239	1.034
M	75-79	77.5	0.14	8.592	2.576
M	80-84	82.5	0.17	16.213	5.901
M	85-89	87.5	0.20	11.568	5.053
M	90-94	92.5	0.24	4.474	2.321
M	95-99	97.5	0.28	0.330	0.202
M	100-104	102.5	0.32	0.428	0.305
M	105-109	107.5	0.37	0.453	0.374
M	110-114	112.5	0.43	0.428	0.407
M	115-119	117.5	0.49	0.000	0.000
M	120-124	122.5	0.56	0.000	0.000
M	125-129	127.5	0.64	0.000	0.000
M	130-134	132.5	0.72	0.000	0.000
M	135-139	137.5	0.80	0.000	0.000
M	140-144	142.5	0.90	0.000	0.000
M	160-164	162.5	1.35	0.000	0.000
M	190-194	192.5	2.28	0.000	0.000
F	10-14	12.5	0.00	0.000	0.000
F	15-19	17.5	0.00	0.000	0.000
F	20-24	22.5	0.01	0.031	0.001
F	25-29	27.5	0.01	0.031	0.001
F	30-34	32.5	0.02	0.674	0.033
F	35-39	37.5	0.03	0.358	0.026
F	40-44	42.5	0.05	1.177	0.120
F	45-49	47.5	0.06	7.512	1.034
F	50-54	52.5	0.09	13.442	2.791
F	55-59	57.5	0.12	4.689	1.229
F	60-64	62.5	0.15	3.992	1.296
F	65-69	67.5	0.18	1.638	0.648
F	70-74	72.5	0.22	1.013	0.481
F	75-79	77.5	0.26	0.461	0.260
F	80-84	82.5	0.30	0.000	0.000
F	85-89	87.5	0.35	0.000	0.000
				millions of lbs of opilio	26.699

BSFRF DATA

Tow	KgOPI	Dens Kg/nm2	
1	78	70,351.95	
2	103.25	93,126.14	
3	62.5	56,371.75	
4	120.5	108,684.74	
5	28	25,254.55	
6	74	66,744.16	
7	52.5	47,352.27	
8	86.25	77,793.02	
9	51	45,999.35	
10	58.5	52,763.96	
11	72	64,940.26	
12	61	55,018.83	
13	50	45,097.40	
14	95	85,685.06	
15	91	82,077.27	
16	48.5	43,744.48	
17	86.5	78,018.51	
18	38	34,274.03	
19	78	70,351.95	
20	37.5	33,823.05	
21	63	56,822.73	
22	303.5	273,741.23	
23	22.5	20,293.83	
24	98.5	88,841.88	
25	60	54,116.88	
26	68.5	61,783.44	
3 Blk Avg Density (Kg/nm2)		68,964.34	KG
3 Blk Avg Density (Lb/nm2)		152,040.15	LBS
		182.90	million lbs of opilio

COMPARED

BSFRF:NMFS
=
Catchability
Coefficient of
0.15